

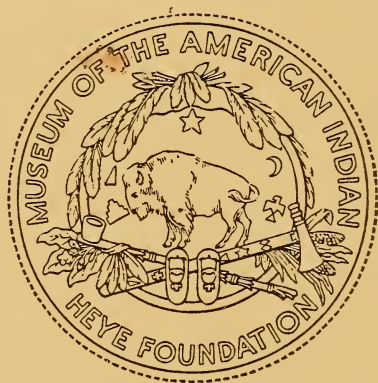
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INDIAN NOTES & MONOGRAPHS



CAYAPA INDIANS
OF ECUADOR

INDIAN NOTES



MUSEUM OF THE AMERICAN INDIAN

AND MONOGRAPHS



HEYE FOUNDATION

INDIAN NOTES AND MONOGRAPHS

No.



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AMERICAN ABORIGINES

THE CAYAPA INDIANS OF ECUADOR

BY

S. A. BARRETT

PART I

NEW YORK
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THE CAYAPA INDIANS
OF ECUADOR

BY

S. A. BARRETT

PART I

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PHONETIC KEY

VOWELS

i	ī	ï
e	ē	
a		
o	ō	
u	ū	û
ai		

CONSONANTS

	Post- palatal	Medio- palatal	Pre- palatal	Dental	Labial- dental	Bi- labial
Stop.....	k g		t d	t	f v	p b
Spirant.....		c	s			
Nasal.....	ñ		n			m
Lateral.....			l			
Inverted.....			r			

y, h, w, as in English.

tc as *ch* in church.

ts as in sits.

ty, ly, dy, diphthongal combinations.

The apostrophe (') indicates a strong aspiration.

ⁿ nasalization.

PREFACE

THE information contained in this volume was obtained during the period from July, 1908, to April, 1909, when the author lived with the Cayapa Indians of northwestern Ecuador. This work was suggested to Mr George G. Heye by Prof. Marshall H. Saville, when he found the rich archeological deposits at La Tolita, near the mouth of Rio Santiago, and was undertaken for the purpose of obtaining information with which to solve certain problems connected with the highly developed prehistoric art in pottery and metal-work shown especially in and about the mounds at La Tolita. The results of the present research have failed to give any clew to the manufacturers of these archeological objects, owing to the great antiquity of the culture represented by them and to the fact that the Cayapa Indians are comparatively recent immigrants into this region. However, many interesting and important observations concerning the ethnology of the region were made, and the results of these are here offered as a contribution to the ethnology of this hitherto little known region of northwestern South America. Forming as they did a part of the field research of the Marie Antoinette Heye Expedition, the studies whose results are the subject of the present work were due to Mrs Heye's interest and generous patronage.

The author left San Francisco in June, 1908, so calculating the time of his journey as to connect, via New Orleans and Colon, with a vessel of the Pacific Naviga-

tion Company at Panama for Esmeraldas. Owing, however, to the irregularity of schedule along this western coast, it was necessary to remain a fortnight in Panama until the next steamer sailed. The arrival of this vessel from the south brought a welcome visit from Professor Saville, who, returning from a summer's archeological research in Ecuador, was able to give further valued information concerning the region to be visited and the encouraging news that health conditions there were then favorable.

Finally, after a voyage of five days, with the usual stops at Buenaventura and Tumaco, our vessel dropped anchor in the harbor of Esmeraldas, where the author was warmly greeted by Mr George D. Hedian, American consular agent at Esmeraldas. Mr Hedian had known Professor Saville for three years and had participated with him in the archeological expedition of the previous summer. His cordial interest, therefore, was threefold: that of a consul, that of a coworker, and, above all, that interest born of whole-souled friendship, as was amply proved throughout the author's stay in the region, and especially evidenced by his fraternal kindness in times of illness and on many other occasions. Mr Hedian's good advice concerning methods of travel and health precautions, and his kind offices in arranging matters of business concerning the expedition, were a result of long residence in the region and of thorough knowledge of the country and its people. The writer takes this opportunity to express his personal appreciation of Mr Hedian's many courtesies.

It seemed best for the writer to remain in Esmeraldas for about a week in order to recuperate from a slight fever contracted at Tumaco during a canoe trip of a few hours to inspect the mounds on El Morro island in the bay of Tumaco. During this week he also had an opportunity to meet all the people of importance in Esmeraldas, the capital and chief city of the province of the same name, and to outfit so far as was necessary for the trip up the Rio Cayapas. Among others the author met the Governor of the province, who kindly gave him letters of recommendation to the local *teniente politico* at La Tola.

Finally, passage was obtained for La Tolita on a *balandra*, or small sloop. The author was accompanied by Mr Hedian, who had arranged his affairs in order to accompany him among the Indians and to see that he was properly introduced to some of their head-men.

After a journey of two days we disembarked at La Tolita, where we were hospitably received by Señor Don Pablo I. Sánchez, owner of the hacienda, and by Señor Don Calixto Ramírez, his business manager. Both of these estimable Spanish gentlemen facilitated in every way the work of the expedition, and it is a pleasure to acknowledge their many kindnesses. Mention must also be made of the tender care given the author during illness by these two and by Señora Sánchez, Señor Don Maximiliano Sánchez, and Señor Don Manuel. Acknowledgment should also be made to these friends for their interest in obtaining a considerable collection of pottery and stone objects from

La Tolita mines, which were presented to the author for the collections of what later became the Museum of the American Indian, Heye Foundation.

This opportunity is taken to acknowledge also our indebtedness to Señor Don Donato Yannuzzelli, of Palma, and to his brother Señor Don Antonio Yannuzzelli, of Esmeraldas, as also to Messrs Dumarest Brothers and others for various favors which contributed to the success of our undertaking.

After several days spent in preparation at La Tolita, we embarked on our canoe trip up the Rio Cayapas, arriving on the second day at the house of Señor Don José Trejo, Secretario de la Gobernación of the Punta Venado division of the Cayapa, who, on being assured that we were not connected with some new mining project, cheerfully permitted us to establish camp in his cane-mill on the bank of the river opposite his house.

After remaining two days, Mr Hedian returned down the river, leaving the author to establish further friendly relations which would enable him to prosecute his investigations to advantage. By care and diplomacy the Indians were convinced that the expedition was not secretly prospecting for mining properties, and that there was no danger of interference with their lands and liberties. In due time, therefore, friendly relations were effected, especially with Don José, and with Señor Don Antonio Napa, head chief, or gobernador, of the Punta Venado division; and ultimately the confidence of the latter particularly, and of various others, was gained to such an extent that it was possible to procure

the desired information concerning the entire culture of the Cayapa people, given in detail in this volume, as well as notes on the language which will appear later. It is fitting that acknowledgment be made here to the Cayapa Indians for their generous hospitality and assistance, contrary to the rule obtaining in North America, almost wholly without direct compensation other than a little medical aid now and then. Especially should acknowledgment be made to their chief, Don Antonio, who made the author virtually a member of his household, and who, together with the other members of his family, facilitated the investigation in every way.

The plates in this volume were reproduced from negatives made by the author in the field and from photographs of specimens collected while the work was in progress and now in the Museum of the American Indian, Heye Foundation. A similar collection was gathered at the same time for the Königlischer Museum für Völkerkunde in Berlin. The drawings of the objects in the Museum of the American Indian, Heye Foundation, were made by Mr Rudolph Weber and Mr William Baake of New York, and Mr George Peter of Milwaukee.

The detail map of the Cayapa region is based on Basurco's map, made for the provincial government, bearing the title "Plano Topográfico del Rio Cayapas y sus Principales Afluentes Levantado en Diciembre de 1891 por Santiago M. Basurco, Ingeniero de la Comisión Exploradora." The Governor of the Province of Esmeraldas courteously permitted the author to make a copy of this map, which proved very useful in

many ways. Investigation showed, however, that the map is not entirely correct in certain details; but these imperfections were adjusted on the copy, and further additions were made from a map placed at the disposal of the Museum by the courtesy of the American Geographical Society of New York.

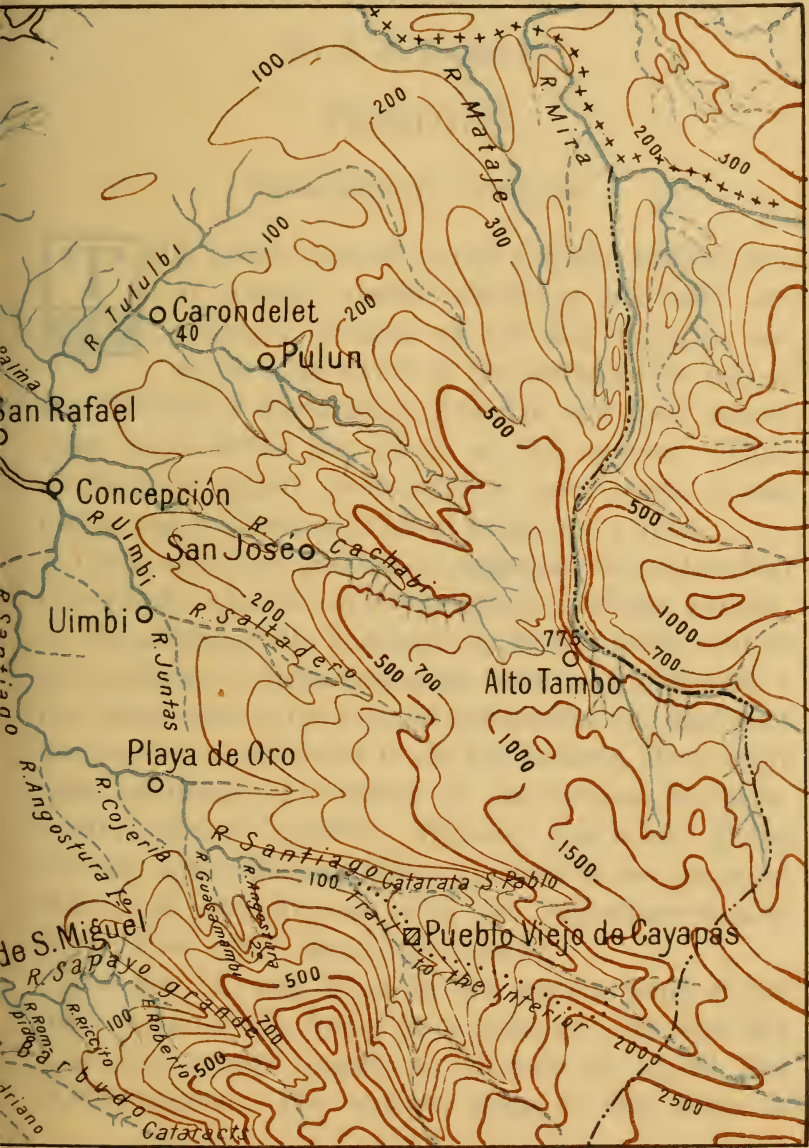
The elaboration of the results of the field work into their final form has been accomplished under many difficulties, since in large measure it has been necessary to perform the task at odd moments after the author's regular duties as a museum curator were finished day by day. Furthermore, the absence of an adequate library within easy reach has added to the difficulties. Acknowledgment is made to The Field Museum of Natural History, of Chicago, for the special privilege of consulting, on Sundays, its books dealing with South America, these being the only days it was possible to visit Chicago for the purpose.

The author takes this opportunity to express his appreciation of the hearty coöperation and of the many valuable suggestions of Professor Saville and of the late George H. Pepper in the preparation of this work; and especially does he wish to acknowledge his gratitude to Mr Heye for his constant encouragement and sympathetic interest.

S. A. BARRETT



TERRITORY OCCUPIED BY THE CAYAPA



PROVINCE OF ESMERALDAS, ECUADOR



THE CAYAPA INDIANS OF ECUADOR

BY S. A. BARRETT

TERRITORY

GEOGRAPHICAL SITUATION

HE people known as the Cayapa Indians live at present almost wholly on the main and tributary streams of the Rio Cayapas, one of the large rivers of the northwestern part of the Province of Esmeraldas, Ecuador, and about ninety miles in a direct line north of the equator. Their territory is within comparatively easy reach of the ocean, which almost all visit at least once a year.

There are a few, perhaps an aggregate of one hundred individuals, who live in several other localities, namely, on the adjacent Rio Santiago, at Pueblo Viejo, and at points along the immediate coast from the Rio Dabele, a few miles south of the town of Esmeraldas, the capital of the province, northward to the Rio Rosario, about eight miles southeast of Tumaco, in the extreme southwestern part of Colombia. However, practically all the Cayapa, approximating fifteen hundred to two thousand individuals, now live on or in the immediate vicinity of the river which bears their name.

The Rio Cayapas heads in the western slope of the coast range of the Andes at a point not far from Mt Cotacachi, which attains an altitude of 16,290 feet (4,966 meters). The western slope of this sierra is

very abrupt; it soon gives place to the broad coastal plain which stretches thence to the ocean and which is broken only by low foot-hills in its eastern part near the higher mountains, and by short, isolated, low ranges of hills and individual hills in its western part nearer the coast. The portion of this coastal plain now occupied by the Cayapa is that along the lower course of the Rio Cayapas and its tributaries. There are very few, if any, who reside as far as the lowest of the foot-hills of the coast range.

The lower course of the Rio Cayapas is wide, very deep, and sluggish; but immediately above tidewater it is a swift, more or less shallow stream, with numerous rapids, and in its upper course its current is so rapid that it may be ascended by canoe only with difficulty, even when not in flood. At time of very high water, on the other hand, the river is quite impassable at certain rapids, especially that known as *Corriente Grande*. The nature of the coastal plain is such as to produce numerous rapids, some of them of considerable extent, but, so far as it was possible to ascertain, there are no cataracts along the lower course of the river.

To the east of the coast range of the Andes, and separating it from the much higher sierra, spreads an extensive valley, at a lofty altitude, in which are situated the chief interior cities of Ecuador, including Quito (9,350 feet, or 2,850 meters), Ibarra (7,380 feet or 2,250 meters), and others. It was here, according to their traditions, that the Cayapa formerly lived. Beyond this great main range of the Andes lies the vast Amazon basin.

The conditions prevailing in this high interior valley offer great contrast with those under which the Cayapa now live, not only as to topography, but also as to climate, natural resources, modes of travel, the nature of their habitations, the food supply, and in various other particulars.

CLIMATE

The climatic conditions of the territory of the Rio Cayapas are typically tropical. The temperature is equable throughout the year, the maximum day temperature ranging, so far as it was possible to determine, between 70° and 85° Fahrenheit.¹ Rains are of almost

¹ "The temperature at night ranges from 65 to 75 degrees Fahr., on cloudy days from 70 to 80 degrees Fahr., and on sunny days from 75 to 87 degrees. The latter degree I have experienced but twice in seven or eight months' residence. . . . Although almost directly under the equator, that burning equatorial heat and those malignant fevers of which we read, are here unknown. The cause of this salubrious climate is the moisture-laden current which, sweeping by the Gallapagos islands, reaches this portion of the Ecuadorian coast and deposits its moisture as it strikes the slopes of the Andes. The clouds shield the country from the direct rays of the sun, the copious rains wash the country clean, the snows furnish cooling water, while constant evaporation tempers and cools the air."—Extract from the report of the engineer to the United States Gold Dredging and Rubber Company, on the Rio Santiago. This report was based on observations made during 1895-96. A report made by another engineer of the same company for the month of May, 1901, gives the night temperature as ranging between 60°-67°F., and the day temperature as ranging between 65°-74°F. The daily rainfall is given in this report as ranging from 0.81 inch to 0.87 inch.

daily occurrence, although the year is divided into a so-called wet season and a so-called dry season. The former corresponds to the fall, winter, and spring months, and the latter to the summer months of the North Temperate zone. At all times, however, this particular region is bountifully supplied with rain, although it is only a short distance north of the more arid portions of the western coast of South America. Beginning with the region about the Rio Esmeraldas, the rainfall rapidly decreases toward the south, and save in a few exceptional areas the territory becomes correspondingly more arid. Even at such a short distance as Manabi the aridity is very noticeable, and still farther to the south, on the Peruvian coast, the country is very arid. To the north, on the other hand, as far as southern Mexico, the rainfall is very abundant, and in some sections may even exceed in volume that of the Cayapa region.

It was not feasible on the present expedition to carry apparatus for measuring the precipitation exactly, but according to systematic observations² made during the first three months of 1895, in April, 1896, and again in May, 1901, on the Rio Santiago, a few miles distant from the Rio Cayapas, and a part of the same drainage system, the daily precipitation ranged from .81 inch to .87 inch, or a total annual precipitation of from 24.63 to 26.46 feet. If data were available for every month of the year, it is not improbable that these figures would be found to vary. Further, if obser-

² See Note 1, page 3.

vations extending over a series of years were available, it would probably be found that the precipitation varies considerably from year to year. For instance, according to reports the winter months of 1909-10 were attended by an unprecedented rainfall. On the whole, therefore, it is safe to assume that the observations of the engineers referred to represent a fair average of the precipitation of this region.

In consequence of the great rainfall and the constant saturation of the ground, floods are frequent along all the rivers of this region. These freshets come, of course, only when there is a continuous and an unusually heavy fall of rain for several hours, or, as sometimes happens, for several days. In the latter event the Rio Cayapas rises several feet at its mouth, which is itself upward of a mile wide, and where the lowness of the bordering lands permits the stream to spread over wide areas. Farther up-stream, where the hills confine its waters, the river rises much higher; and at some points, where for considerable distances there are no low flood-plains and where the banks are steep, it rises as high as fifty feet.

As a result of such conditions there has been developed a form of pile-dwelling, the floor of which is raised from six to twelve feet above the ground. The Cayapa always endeavor to build their houses as near the river as possible, on account of their dependence on it as a means of travel and for other purposes. The floods, however, must always be taken into account in selecting a site even for such a pile-dwelling, since at times of such

floods it not infrequently happens that the waters rise so high as completely to surround the house, and indeed sometimes to within a few inches of its floor.

The excessive rainfall naturally produces great humidity,³ which would be very oppressive were it not for the fact that the sky is almost constantly overcast, so that the full power of the sun is rarely felt in the region. This fortunate circumstance renders the climate, which would otherwise be almost intolerable, very equable and pleasant.

RESOURCES

TREES AND PLANTS

By virtue of the climatic conditions above set forth the vegetation of the Cayapa region is typically tropical. Almost every foot of ground is covered by a dense jungle growth comprising many species of trees, palms, shrubs, and smaller plants, and characterized by an abundance of vines and parasitic vegetation. So dense is this growth that it is practically impossible to travel on land even a short distance without the use of a machete.

Among the most important and characteristic plants of the region are the various species of palms, many of which are put to use by the Cayapa in one way or another. In the following list of the trees and plants of this section are given the Cayapa and the local Spanish names of those palms which are most useful to the

³ One of the engineer's reports, above referred to, places the humidity at an average of about 80 per cent.

Indians. A number of these palms produce foods, and several provide leaves which are used in making house-thatch, while the trunk of one makes a durable flooring for houses. These matters will be taken up more specifically in the discussion of these subjects.

Another characteristic plant is the giant bamboo, which grows in clumps at frequent intervals along the banks of the rivers, especially along their lower courses. This bamboo often reaches a height of seventy feet or more, and has a basal diameter approximating ten inches. These immense stems serve various useful purposes, among the most important of which may be mentioned that of joists and rafters in house-building.

There is a great variety of trees in the jungle, many of which produce useful woods. Perhaps the most important uses of wood among the Cayapa are in house construction and in canoe-making. In the former the guayacan, which provides the almost indestructible pillars that support the pile structures, is of greatest importance. Several varieties of trees are used in canoe-making, but two or three kinds are preferred to all others.

Another characteristic of the jungle is the association of many species of plant life together in one area. Whereas in the North Temperate zone it is customary to see large tracts of land occupied by a single principal species of tree, such as the pine, in this Ecuadorian region a considerable number of trees of one species growing close together and in such manner as to form anything comparable with a grove is rarely seen. As a

rule the various species of trees are associated in a strictly heterogeneous manner, and in all cases there is a fairly dense undergrowth, besides vines and aerial roots in abundance. These latter hang from the trees in such profusion as alone to make it necessary to cut a trail in proceeding even for a short distance by land.

Of these aerial roots the one known by the local Spanish term *pitigua* deserves special mention. It is very strong and durable, is little affected by climate, and is not attacked by insects. It is, therefore, extensively employed in binding joints in house-building, and indeed wherever a good binding material is needed. It is also extensively used in making certain kinds of basketry.

This general mention of the natural vegetal resources of the Cayapa region will suffice for present consideration, but the separate plants and their particular uses will be treated in detail in the following pages in connection with matters with which they are particularly concerned.

The heterogeneity of the flora of the region, above referred to, is fortunate for its inhabitants, since it places nearly every kind of plant, on which so much of the culture of the Cayapa Indians depends, within comparatively easy reach of all. That the flora should be so varied in any given locality, and that any given species should be so generally distributed, is due to the almost identical climate, soil, and other environmental conditions throughout the region.

The following is a list of the principal vegetal resources, both indigenous and introduced, employed by the Cayapa:

Trees and Plants

ENGLISH	SPANISH	CAYAPA
rubber	guayacan	waiaka'n ⁴
cedar	caucho	sa'be
	cedro	inū'n-tcī, or inō'n-tcī
	guadaripo	tū-tcī
	amarillo	pītōa'lō
	balsa	na'na
	dama jaua	te'ckī-tcī or tū'ckī-tcī
	achote	ca'imū (canyūn-tcī = the shrub)
	hawa	ma'iñ-tcī
	guabo	cī'lyū (cī'-tcī = the tree). See p. 109
	guabo macheton	mactē-pa' cīlyū
	guabo dulce	pī' cīlyū
	guabo tacoane	nī'nga cīlyū
	guabo agria	sa' cīlyū
calabash	calabaza	pū' cīlyū wa'iyū (wa'i-tcī = the tree), also cu'lya
chocolate	cacao	kaka'bō
papaw	papaya	papa'ia
	caimito	a'kū'iñya (akūi'ñ-tcī = the tree)
	zapote	sapō'te
orange	naranja	la'nsa (lansa'-tcī = the tree)

⁴ In some instances these names are invariably given by informants with *tcī*, signifying tree, following the root of the word; in others this is never added unless it is intended particularly to show that the tree itself is meant. In some cases the addition of *tcī* causes considerable phonetic change in the root. In those cases where the simple root form and also the compound form were obtained, the latter follows the former in parentheses.

ENGLISH	SPANISH	CAYAPA
lemon	limon	lě'mō (lēmō'-tcī = the tree)
	chocolatillo	tcōkōla'te, tcōkōla/i'a
sandpaper tree		lya'pic-hakī
plantain	platano	pa'nda
banana	seda	sē'da, sēda-kīnī'a
	hoja blanca	fī'ba-hakī ⁵
	hoja negra	e'lūñ-hakī
sugar-cane	caña dulce	e'lla
wild cane	caña brava	nya'nyī
corn	maiz	pī'cū
tobacco	tabaco	ta'kō
	yuca	kū'tcū, kū'ctcū
	rascadera	iū'a
pineapple	piña	tcī'lya
pepper	aji	tyū
	yerba buena	ēvī vē'nō ⁶
pumpkin	sapayo	ū
	kuna-kuna	wa'-tcī
	matamba	bī'ta
		nintcū'a ⁷
	tangarea	ōlō'n-tcī

Palms

ivory nut	palma tagua	tī'mō būlō (tī'ñ-tcī = the palm) ⁸
	palma real	ūya'-tcī

⁵ This term, like the Spanish *hoja blanca*, signifies "white leaf."

⁶ The name of this introduced plant is obviously a corruption of the Spanish.

⁷ A porous vine used as a smoking material by children.

⁸ In the majority of cases the names given by informants for these palms are combinations of the simple names of the palms with the word *tcī*, signifying "tree." The five cases in which the simple name was obtainable are here noted, the compound terms following them in parentheses.

ENGLISH	SPANISH	CAYAPA
	palma palmicha	sā'wī (sa'n-tcī = the palm)
	palma chonta dura	ka'imbī (kanō'-tcī = the palm)
	palma chapil or milpeso	kūla'pō-tcī
	palma guividnande	vīnga'-tcī
	palma guinul	pūka''-tcī
	palma pambil	bū'a (bū'īn-tcī = the palm)
	palma crespá	pī'nlya-tcī
	palma chontilla	pē'aputc
coconut	palma coco	kō'kō (kō'kō-tcī = the palm)
fan-leaf palm	palma rampile	pī'tcūa ya'ha kapi'm-tcī

GAME

Game is abundant in the jungle, and there are fish of various species in the streams. The ocean is within a comparatively short distance and its shores abound in many species of Crustacea and mollusks, as well as in the various salt-water fish, all highly prized by the Indians.

The specific uses of each species and its mode of capture, together with other points of interest in connection with it, will be taken up in detail at appropriate points in the following pages. For the present purposes it will be sufficient to give lists of the principal mammals, birds, fishes, Crustacea, mollusks, reptiles, and amphibians which are found in the region.

These lists, like the list of trees and plants previously given, are by no means complete, since they include

only the principal species with which the Indians are particularly concerned. Moreover, it is a source of regret that it is impossible, except in a very few instances, to give the scientific names of any of the species mentioned. It was originally intended that a collection should be made of all those forms of vegetal and animal life employed in any way by the Indians. In fact, a good beginning had been made in this matter, and considerable time had been spent in preparing mammal and bird skins during the first three months' residence on the river, but, unfortunately, during the author's illness from fever for nine weeks, these specimens were completely spoiled by insects and no time was available later to gather another collection. The only specimens saved were certain insects preserved in alcohol.

MAMMALS

ENGLISH	SPANISH	CAYAPA
deer	venado	ma'na
wild hog	saino	aven-dū'cū, awen- dyū'cū
peccary	tatabara	na'-tcūcū, ne-tū'cū, ka'ne tyūcū
tame hog	puerco	kū''tcī, kō''tcī
(large rodent)	guanta	wala'mbū
(large rodent)	guatin	kō'yō, kū'yū
jaguar	tigre	kē'la, a-kē'la
black-marked species		pabañe'la
red-marked species		lakembī'lya
ocelot	tigrillo	tōmañ-gē'la
puma	león	lyū-kē'la, lyū-kē'na
monkey	mono	wa'cū, wo'cū

ENGLISH	SPANISH	CAYAPA
monkey	mico, machin	cū'rī, cō'rī
howler monkey	mongon	hōyū'ngū
	cusumbi	wa'sū, wa'se
squirrel	ardilla	ī-ya'mbū, ya'mbū
armadillo	armadillo	tcil-ya'mbū
rat (large species)		
of wood rat)	raton	ī'yō
rat (small species)		pakōla'la
	zorra	cī'ni

BIRDS

toucan	paliton	tcandō'tō (o) ⁹
toucan (small species)	pichilingo	pī'tcī (o)
grouse	perdiz	ū'ndūrūrū, ō'ndōrōrō (o)
turkey, wild	pava, drumalona	ē'lī
turkey, wild	pavon, cantona	ka'ntsū
turkey, domestic	pava	kastī'lya walya'pa
dove	paloma	mabō''kō (o)
		pastō''kō (o)
		wa'pū'pū (o)
buzzard	gallinaso	kū'ndūrūrū, petyū'tyū
pelican	alcatraz	nana''ka
	guacharaca	watcara'ka (o)
frigate bird		nyambīwa'tū
hawk	gabilan	hūya'lyū
hawk	gabilan de machiñ	cūī hūya'lyū
hawk	gabilan de mono	wac hūya'lyū
	canchimalo	tcañgō'kō
	catanita, panchana	kīwiku'ctcī

⁹ As elsewhere among aboriginal peoples, onomatopoetic terms are of frequent occurrence among the Cayapa, the tendency being especially noticeable in bird names. Terms of this kind in the above list are indicated by means of (o) following them.

ENGLISH	SPANISH	CAYAPA
parrot (large green)		lō'rō, alō'rō
parrot (small green)		kū' kōtcī
macaw	catalina	a'kara

REPTILES AND AMPHIBIANS

boa constrictor	gualcauna	hūrūhūrū
boa constrictor	sobrecama	we'sū
alligator	lagarto	e'mbū
crocodile	caiman	e'lmbū
crocodile, young	tulisio	dōnī'cū
iguana	iguana	ara''pī
lizard (large species)	piande	bīmbū'ka
lizard (large species)	lagartilla	dūmbē'la
lizard (chameleon-like)		kapūtckē'rūn
salamander	salamanca	wacpī'nī
tree-toad or frog		pa'tata

FISH

shad	sabalo	awī'li
sting-ray		pīpū''pū
	verugate	tyū-wī'li
		antca'ma

MOLLUSKS

oyster	ostion	osti'ñ, osteō'n
	piangua	pī'añgū, icpīa'ñgūa
	chiripiangua	tcī'rīpīa'ñgūa
periwinkle		ka'kū
	almeja	tcū'ya

CRUSTACEA

ENGLISH	SPANISH	CAYAPA
crayfish	camaron	a'bīcū, pī'cū
crayfish (another species)		karna'da (?)
crab	cangrejo	nē'lū, nē'lō
crab (a particular species)		tepūi nē'lū
crab (a particular species)		kaia nē'lū
crab (a particular species)		kaia'pa nēlū
	mapara	ma'para

INSECTS

Many species of insects abound in the Cayapa region, though few of them directly concern the Indians in an economic way. In view of the fact that many of these insects are not mentioned later in these pages, it seems appropriate to enter more into detail at this point respecting certain of them than was necessary in dealing with plants and animals.

Among the insects worthy of particular mention are certain malevolent ones, such as centipedes, scorpions, tarantulas, ticks, stinging gnats and, above all, the mosquito, of which there are a number of species. Contrary to the conditions in many parts of the tropics, however, there seems to be a total absence in the Cayapa region of the yellow-fever bearing species of mosquito, as there is also of the plague-bearing flea. Hence this particular section of the tropics to the present time has been entirely free from these two dreaded maladies,

though both exist at various other points along the western coast. There appears to be no particular lack of hosts for either of these insects; and from the fact that the yellow-fever mosquito does exist at Tumaco, only a short distance north of the mouth of the Rio Cayapas, one is at a loss to account for its absence from a region so close as Esmeraldas province where climatic conditions are similar. In the case of the flea, however, at least one possible explanation appears, namely, the difference in climate between the Esmeraldas region and that of the vicinity of Guayaquil. At Guayaquil and southward the coast is comparatively arid, thus giving favorable dry breeding places for the flea, while from Esmeraldas northward the rainfall is very great, consequently the ground is thoroughly saturated and the breeding grounds of the flea are greatly diminished, if not altogether lacking.

Of the mosquitos which do exist here the most dangerous are those of the one or more species which are said to transmit malaria—the “tropical” or “jungle” fever as it is commonly called. Fortunately these pests appear not to be very numerous; at least the cases of “jungle” fever among the Indians, as also among the whites and negroes, are not numerous. Probably a certain degree of immunity is experienced by natives and old residents, for as a rule they have comparatively light attacks of the fever, though often a newcomer is violently infected and sometimes with fatal results.

Another annoying species of mosquito is a small one, the bite of which produces a local infection which slowly

spreads if not promptly checked. The remaining species, of which there are several, are also annoying, but their bites appear to produce no particularly evil effect.

The tick is found only about the mouth of the Rio Cayapas and elsewhere along the immediate coast. This annoying insect is said to be almost exclusively confined, in this region at least, to those sections where domestic animals, particularly cattle and horses, are kept. Thus the Indians, by virtue of their location, are little troubled by it, though much annoyance is experienced by others living where it occurs at all abundantly.

Centipedes, scorpions, and tarantulas are encountered only occasionally, but their bites and stings cause considerable trouble now and then. The centipedes are the most numerous and are of large size, reaching a length of fifteen inches or more. There are also certain other poisonous insects not known in temperate regions, but these appear to be rare.

Among the malevolent insects which do not injure man directly are the termites which destroy woodwork and even extend their tunnels into the dwellings. The damage they do, however, is never considerable.

There are many species of ants in this region, the most of which are quite harmless. One, however, the so-called army, or driver, ant is of importance, though it must be regarded quite as benovolent as it is malevolent. This species travels in great armies, as the name implies. It is strictly carnivorous, and will attack almost any living animal, whether large or small.

It is claimed by the Indians that if an army of these ants enters the dwelling, there is but one recourse, namely, its occupants move out and visit nearby relatives or friends for a day or two. Meantime the ants penetrate every nook and corner of the house from top to bottom, including the palm-leaf thatch, and devour or drive out every living thing in it. Cockroaches, one of the greatest pests of the region, are almost always present in large numbers in the thatch, but after a visitation of army ants, they, together with the centipedes, scorpions, and all other forms of insect life have disappeared.

While residing in the cane-mill previously referred to (pl. VI), a short distance above the village of Punta Venado on the lower course of the Rio Cayapas, at about ten o'clock one morning there appeared on the ground about the house a large number of these ants. On investigation it was found that they were issuing from the jungle in myriads, traveling along an old and fairly well-beaten Indian hunting trail that led from the jungle out into the clearing. The cane-mill was surrounded by a clearing of about two acres, with a relatively open portion, about half an acre in extent, immediately adjacent to the mill. The cane, which had been recently planted in this area, did not exceed a foot or so in height, hence a good opportunity was afforded to observe the movements of the ants. To all appearances they paid attention to nothing except their journey, so long as they were on the trail within the jungle; but immediately they reached the edge of the clearing, the dense line, which was as wide as the trail

would permit, broke into several smaller lines which deployed in various directions as the ants commenced their hunt for food. This hunt was thorough to a degree, and involved searching every nook, corner, and crevice of everything they encountered. While thus hunting, the ants passed in large numbers around and under the cane-mill, but for some unknown reason, and much to our relief, they did not climb the houseposts and overrun the mill itself.

A species of small red land crab is very abundant throughout the region. Many of these crab burrows were seen in the vicinity of the cane-mill, which gave an opportunity of observing the attacks of the ants upon the crabs. The scene about the mill during one of these attacks was so animated that it was scarcely possible to keep watch of any particular crab burrow and thus observe the ants as they besieged it. The observer became aware of their presence there, however, when the rightful owner of the burrow suddenly emerged from its entrance and scuttled away in vain endeavor to rid himself of his tormentors. Running first one way, then another, in his attempt to escape, the crab soon found that, while he had been attacked in his burrow by from half a dozen to perhaps a score of ants, each of which clung tenaciously, the farther it ran the more of the enemy it accumulated, until it was finally overcome by sheer force of numbers. Now and then, of course, a crab managed to escape.

Perhaps the most striking instance of the methods employed by these ants in their foraging was given by

their ransacking of a heap of old crushed sugar-cane stalks, commonly spoken of as "cane-trash," which lay in front of the mill. To all appearances this refuse pile was not inhabited, but when the ants commenced their search of it, it proved to be literally alive with land crabs and with insect life of various kinds. As a rule, these occupants which succeeded in reaching the surface of the pile, did so in each case with several ants clinging tenaciously to them. Now and then one of the flying creatures, such as a cockroach, would endeavor to escape by means of its wings, but would usually alight within a few feet in order to try to rid itself of the clinging ants, but it usually found that these efforts were rewarded only by an attack of a larger number of the pests.

After two or three hours of hunting and feasting in this clearing, the army of ants took its way up the river-bank and disappeared into the jungle, leaving no trace of its visit save an empty crab-shell or other mute reminder here and there.

Many stories are told by the Cayapa and others of the work of these ants, some of them tending to show what may be regarded as a certain degree of sagacity on the part of the ants. That they work in unison in their attacks on small animal life is shown by the above personal observation, and this fact may be taken as in a measure corroborative of the following experience of Señor Don Calixto Ramírez, who has resided for many years in this region and who has had excellent opportunities for observing its natural history.

Shortly after Señor Ramírez's arrival in this section of Ecuador, he had occasion to be out looking up cattle, in company with a friend who at the time was an old resident. They were on the upper course of the Rio Santiago, and in riding along they observed a line of army ants so moving as to indicate that they formed a segment of a circle, the remainder being hidden by the jungle. The two observers tied their horses a short distance away and followed the ants, as the circle moved inward, until they reached a point where the center of the circle was visible. There they saw, to their surprise, a coiled equis, the most venomous snake of the region. The serpent was perfectly quiet, and apparently asleep. The ants moved cautiously in until their circle enclosed a space of but a few feet in diameter. At this juncture four or five ants approached the equis and finally bit it, thus causing the snake to bestir itself. It moved off toward one side of the circle of ants, where it met a warm reception; it then raced in another direction, with no better result; and so it darted in various directions in its frenzied endeavor to escape, until finally the circle closed in completely, when nothing was to be seen but a writhing mass of ants and the snake, a foot or so high and two or three feet in diameter. Time did not permit the observers to witness the disposal of the snake, but on their return, a few hours later, there was not an ant in sight, but as an evidence of the combat, the snake's skeleton, picked absolutely clean, lay at the point where it met its fate.

There are also many other kinds of ants, among which

may be mentioned at least one species of leaf-cutting ant whose peculiarly spiny body presents an interesting appearance, though it is in no way of special importance to the Indians. One very large, black, stinging ant, called *conga* in Spanish, and *nyû'mī* in Cayapa, is much feared by the Indians and others resident in this region, for the reason that its sting produces not only an annoying local irritation, but also a rise in the temperature of one bitten, so that it is commonly said that the sting of the *conga* insures two days of fever.

Certain species of small bees are of value to the Indians, particularly in the production of the wax used in calking canoes and pottery, and in painting canoes; it is also employed remedially to a slight extent as a cure for cuts and abrasions. The honey made by these bees is very little sought as a food, and is quite secondary in value to their wax. The Indians recognize four classes of these bees. The *paba ta'nda* is a small black species that lives in trees and makes the best wax which is yellow in color and is produced in larger quantities than that made by any of the other bees. The *ciñemi'ski*, also a small black bee, lives in the ground and produces an inferior black wax which is used only to a limited extent by the Indians. The third of these small black bees is the *ta'nda*, which lives in trees but which produces much more honey than wax. The fourth species, *amūi a'ma*, is a small yellow bee which likewise lives in trees and produces a black wax that is used to a considerable extent.

Certain insects are employed as food. Two of these,

which were observed, were a large, black, beaked beetle (*Rhynchophorus palmarum*), called kũ'perũ by the Cayapa, and a large white larva called kōmu'cũ by them.

Certain other insects, though of no special economic importance, are of interest to the Indians. One in particular is a large beetle (*Euchroma goliath* L. & G.) whose iridescent wing-covers are employed in making necklaces. There are also large, beautifully colored butterflies, dragonflies, and a large firefly (*Pyrophorus pellucens*), besides a host of other species of insects of greater or lesser interest.

Insects

ENGLISH	SPANISH	CAYAPA
beetle (<i>Rhynchophorus palmarum</i>)		kũ'perũ
beetle (<i>Euchroma goliath</i> L. & G.)	cucaron	kabē''tsũ
firefly (<i>Pyrophorus pellucens</i>)		mũ'lũkũ
bees		paba ta'nda ciñemi'skĩ ta'nda amũĩ a'ma
ant (a large, black, stinging ant)	conga	nyũ'mĩ
larva (a large white larva)		kō'mucũ
larva	cogoyo	avĩ'
a worm or caterpillar	hualpe	tcĩlĩ'li

MINERALS

Among the natural resources of the country should be mentioned its minerals, certain of which are found

in considerable deposits along this portion of the coast of Ecuador. In fact this region, like a large part of the western coast of South America, is rich in precious metals, those present in this particular locality being chiefly gold and platinum, although silver and copper are also found. It is an interesting fact that platinum first became known to the civilized world through its introduction from the Province of Esmeraldas; it had, however, been discovered and employed to a considerable extent in the making of ornaments by the aboriginal inhabitants of the region about the mouth of the Rio Santiago before its introduction into the modern arts, in fact long before the coming of Columbus. The high development reached in the art of metal-working by the ancient inhabitants of this section is shown particularly by the elaborate and delicately wrought ornaments of gold and platinum, and occasionally also of silver and copper, found so abundantly at La Tolita near the mouth of the Rio Santiago and at certain other points in that vicinity.

The Cayapa Indians of the present day are quite differently disposed toward metal-working, for they have no knowledge of the art, now using no metal objects other than those obtained by trade, such as axes, adzes, and machetes. They assert that they never came into contact with the ancient metal-workers of this region, for the reason that they were long ago driven out or exterminated by another tribe which the Cayapa in turn banished in comparatively recent times. Not only do the Cayapa do no metal-work themselves, but

they have no knowledge of mining and are not at all inclined to acquire such knowledge even though they realize that gold and platinum command good prices at the settlements. Furthermore, they are extremely distrustful of and even hostile to everyone connected with mining or prospecting enterprises.

HEALTH CONDITIONS

Associated with the natural resources of a region are its health conditions, which in the Province of Esmeraldas are very good in comparison with most parts of the South American tropics. In fact the Esmeraldas shore is reputed, on good grounds, to be the most salubrious territory of the entire western coast of South America. Indeed, during the entire time spent by the author in the region, there was not, so far as could be learned, a case of any of the ultra-serious contagious diseases, and certainly none was reported in those portions of the province in which he resided. During the same period, however, both bubonic plague and yellow fever broke out with marked violence at Guayaquil, about two hundred miles southward, and there was also an epidemic of yellow fever at Tumaco, not more than fifty miles to the north along the coast from the mouth of the Rio Santiago. As pointed out in speaking of the insects of this region, neither the plague-bearing flea nor the yellow-fever bearing mosquito are found in the Province of Esmeraldas, hence the absence of these two diseases.

The most serious, and in fact practically the only serious, contagious disease of frequent occurrence in

this section is a form of malarial fever locally called paludismo; but this malady is so mild in comparison with the diseases above mentioned as to be almost negligible in a comparative consideration of the general health conditions of the region. The attacks of paludismo on newcomers are often severe, and now and then result fatally, but a native or an old resident of the region is usually fairly immune from it.

It is said that typhoid is entirely unknown; indeed no signs of it were observed during the author's stay in the region. Dysentery, which is such a serious malady in certain parts of the tropics, is little known here, though sporadic cases occur; in fact, two cases came under the author's observation, but only one of these was fatal, and this largely by reason of a complication of conditions combined with inadequate care.

It may be said, therefore, that the region inhabited by the Cayapa, and in fact the whole Province of Esmeraldas, is very healthful in comparison with other parts of the tropics.

SURROUNDING PEOPLES

The only people at present known to have close linguistic affinity with the Cayapa are the Colorados of the upper course of the Rio Esmeraldas. Dr D. G. Brinton¹⁰ places the Cayapa in what he terms the Barbacoas linguistic stock, taking that name from a people formerly living on the upper Rio Patia in south-

¹⁰ Brinton, *The American Race*, pp. 196-199, New York, 1891.

ern Colombia. Brinton's limits of this linguistic stock are not very clearly defined, but are given roughly as extending from the headwaters of the Rio Daule, which empties into the Gulf of Guayaquil, northward to the vicinity of the Rio Patia, which empties into the ocean north of Tumaco in southern Colombia, thus extending from about one degree south to two and one-half degrees north latitude. The information at Brinton's disposal did not enable him to locate exactly the various peoples which he includes in this stock, but he names the Barbacoas, Cayapas, Colorados or Sacchas, Cuaiqueros, Iscuandes, Manivis, and Telembis. It is not at all unlikely that the peoples whom Brinton calls Barbacoas, Iscuandes, Telembis, and perhaps also the Cuaiqueros, are in reality only small bands of Cayapa who had gone into the localities which still bear these several names, and that the vocabularies and other information on which he based the classification were collected from them at these places, with the result that these people came into literature as four distinct divisions.¹¹ The same thing has happened in many instances in North America,

¹¹ It is highly probable that the meager vocabularies on which Brinton based his classification of these several supposedly distinct groups of people under the one family name were recorded by various systems of orthography, used by travelers whose mother tongues were different, and who in most, if not all, cases were not trained in the study of aboriginal languages. This would be sufficient to account for the considerable differences in the vocabularies—differences which, in the absence of further data, would warrant anyone in considering the various peoples as dialectically distinct one from another.

hence it is now being found that a people speaking a single language appears in literature under several different names. As already pointed out, a few of the Cayapa at the present time are scattered along the coast from a point north of Tumaco to some distance south of Esmeraldas. These small bands near the coast are far more accessible to travelers and naturally would be encountered first by them. Hence it could very easily have happened that the several different peoples reported to Brinton, probably by as many different travelers, as separate groups, but whose languages proved to be closely related, were simply these bands of Cayapa who were then, as they are now, living apart from the main body along the Rio Cayapas. Furthermore, if the above assumption is true, it is probable that these Cayapa of the coast then recognized, as they do now, their identity with the main body of the people.

The fact that almost all the rivers, and especially all the smaller streams, as well as other physiographical features of the whole region, mentioned by Brinton, still bear names that are of Cayapa origin, is strong evidence that the Cayapa at a comparatively early date had spread over this large area and that they were familiar with and probably in possession of, so far as other Indians were concerned, the territory from a point some distance north of Tumaco southward. It therefore seems very probable that what appeared to Brinton as several linguistically related groups are in reality parts of a single group, and that formerly, as now, the only other people so far reported who have any

close linguistic affinity with the Cayapa were the Colorados.

The dialect of the Colorados, however, is so different from that of the Cayapa as to be almost unintelligible to the latter. Their customs, dress, and general culture are also quite distinct, and their territory is of a very different character from that of the Cayapa, being decidedly mountainous, though not far enough inland to be at a great altitude. There is no political or social affinity between the two peoples; in fact, although belonging to the same linguistic stock, the only knowledge one has of the other is that gained from an occasional visit by two or three Cayapa to the Colorado country, or vice versa. It is told as one of the important events of recent times that in returning, several years ago, from a visit to Quito, the chief of the Punta Venado division of the Cayapa came by way of the Colorado country and spent several days there, and that he finally brought home with him a member of that tribe who visited on the Rio Cayapas for some days before returning to his own people.

That the Cayapa have wider linguistic affiliations has been recently shown by Drs Beuchat and Rivet,¹² who set forth the fact that there is considerable affinity between the Barbacoas, of which the Cayapa is a dialect, and the Coconuco and Paniquita groups, both of which are in Colombia. The interrelations of the latter two

¹² Affinités des Langues du Sud de la Colombie et du Nord de l'Équateur (Groupes Paniquita, Coconuco et Barbacoa), par H. Beuchat et P. Rivet, extrait du *Muséon*, Louvain, 1910.

groups are much closer than are those of either with the Barbacoa, but there seem to be a sufficient number of features in common between these two Colombian stocks on the one hand, and the Cayapa and Colorado dialects on the other, to warrant the inclusion of all these in a larger group or linguistic family.

On the north the nearest Indian neighbors of the Cayapa are those commonly called by the ambiguous term "Cholos," and who live along the Rio Saija, a small stream which empties into the ocean at about $2^{\circ} 50' N.$, at a point nearly opposite the island of Gorgona. These people are entirely different from the Cayapa in language and culture; but there is a certain amount of intermingling between the two, and a marked influence is exerted by the Cholos on some features of Cayapa culture, especially medicine practices.

The only other Indian neighbors of the Cayapa are the Quichua, or Kechua, descendants of the historic Inca peoples, who live in the interior valleys, the nearest being those about Ibarra and Cotacachi. Although they are of an entirely different linguistic stock, there is here also a certain amount of intermingling, small parties of Quichua making occasional trips down to the coast, and small parties of Cayapa making occasional trips into the mountains. At the present time, however, the trails are much neglected and are extremely difficult to travel, so that the intercourse is very slight.

The only other peoples with whom the Cayapa come into contact are the few European or North American whites, and the many negroes, descendants of former

slaves of this western coast, especially of Colombia. These negroes live adjacent to and mingle very much with the Cayapa, and have exerted a strong influence on some features of their culture, especially their music.

HISTORY

According to Cayapa tradition, the original home of the people was in the mountains near Ibarra. At a time probably very near that of the advent of the first Spaniards, the Cayapa as a body moved to what is now known as Pueblo Viejo de Cayapas, in the mountains drained by the upper course of the Rio Santiago. Various reasons are given for this migration, some affirming that it was because of their fear of the invaders (and, as one informant said, especially the fear of their horses), while others say that it was due to the general alteration in their mode of life as a result of the conquest. Still others claim that the migration occurred some time prior to the conquest, and that it was due to their love of peace and their distaste for the hostilities forced on them by the invading Quichua, or Incas as they are so often called, who, only a comparatively short time prior to the arrival of the Spanish explorers, had invaded Ecuador and subjugated its various peoples in the interior, even as far north as what is now the northern boundary of the republic. One informant related a traditional tale to the effect that the Cayapa migrated by the advice and under the leadership of a certain shaman who, dissatisfied with conditions as they were at Ibarra, called through his magic a jaguar which he entrusted with the duty of finding a more suitable abode. After

about a month's wandering, the jaguar returned and reported to the shaman that the most suitable place was the then uninhabited region about Pueblo Viejo. Acting on this advice he assembled his people and all departed for the new locality. Here the Cayapa lived for a considerable length of time in much the same manner as before—typical mountaineers, knowing very little of river life, and with maize as their staple food.

At that same time the rivers Cayapas and Santiago, and the coast adjacent, were occupied by another people, very vicious and always enemies of the Cayapa. By some they are said to have been cannibals. They preyed constantly on the Cayapa, killing them whenever and wherever encountered. The Cayapa, on the other hand, were then, as they are now, a very peaceable people; but after many years of these outrages they organized war-parties which descended the rivers and exterminated the enemy. These people are always referred to by the Spanish term *Indios Bravos* ("wild Indians"), and are described by some informants in fanciful, mythical terms. By most, however, they are declared to have been like ordinary people, except that both men and women wore skirts of bark cloth and otherwise dressed differently from the Cayapa, and that they were very ferocious. Some claim that in this war of extermination all these *Indios Bravos* were killed; others claim that a few escaped to the mountains about the extreme headwaters of the Rio Esmeraldas, where their descendants still live and are much feared even at the present time.

It is said that these people whom the Cayapa are reputed to have conquered are not the people who formerly lived at La Tolita and built the mounds and made the pottery and metal objects so abundant there. That was a still different tribe which occupied the region prior to the time of the people whom the Cayapa exterminated. And they are likewise quite a different people from those formerly living along the lower course of the Rio Esmeraldas. It is said that at a point on this river a short distance above the present town of Esmeraldas, there lived, before the coming of the whites and negroes to the region, a tribe of Indians called Wásū. They were like the Cayapa in appearance, but had a language entirely different from that of the Cayapa or of any people now known to them. It is said that there were a few of these Indians in the vicinity of Esmeraldas up to within a generation or two past, but that they are now extinct. No words of their language were recalled by any of the Cayapa informants.

Accounts of the migration of the Cayapa from Pueblo Viejo to their present abode vary somewhat. One informant gave the following account which attributes the success of the Cayapa to magic.

After the Cayapa had been subjected to the depredations of the Indios Bravos for many years, it was determined that some action must be taken to insure their safety. Accordingly three men were sent out to reconnoiter. They came down the river on a small raft, using the greatest care to make no sound and traveling entirely at night. They reported that there were

great numbers of the Indios Bravos living in villages along the river.

Next, two young women were sent down, who at last discovered a house containing two Indio Bravo men asleep. Approaching cautiously, they discovered that these men held clasped very tightly under their arms short lance-shape wands which, by working with the utmost caution, the women were able to remove. They took these objects back to Pueblo Viejo and gave them to their husbands, who set about at once to learn from the wands the various magic, death-dealing powers which they possessed. At first the wands refused absolutely to divulge anything, but after being frightened with threats of burning, they consented to teach the men during the night.

When night came, therefore, the wands flew about the house and exhibited their magic power. They taught the men what parts of the body were vulnerable to them, and how, on the other hand, they might be caught in the arm-pit, by the side of the head, on the shoulder, in the inner angle of the elbow, in the angle of the knee, and by various other parts of the body. The wands also taught these men how to dodge their own attacks, and also how they might be used in killing the uninitiated. These men, in turn, taught others, until a considerable company of magicians had been thoroughly trained.

At last an expedition of ten of these magicians, each with his wand, which had been thoroughly tried, started down the river to attack the Indios Bravos. One

magician, who was especially powerful, remained in his house at Pueblo Viejo to chant the proper incantations to pacify the souls of those who were to be killed, in order that they might not harm any of the attacking party of magicians. The members of the party approached in succession and with great caution the various points inhabited by the Indios Bravos. At each place they made a sudden attack, using their wands with deadly effect. These attacks were met by a stout defense on the part of the Indios Bravos, but the wands of the Cayapa had been so thoroughly trained and proved that they were able to fly against those sent by the enemy and break them, and later to kill everyone in the village attacked.

The Cayapa first attacked the Indios Bravos living along the Rio Sapayo Grande; next those along the Rio San Miguel; next those along the Rio Camarones; then those along La Herradura de Cayapas, and so on down the Rio Cayapas, up the Rio Onzole, and again down the Rio Cayapas to its confluence with the Rio Santiago. They also visited destruction on the inhabitants along the Rio Santiago, and finally made their way down to the coast. Here the magicians divided, part going along the coast as far as Tumaco on the north, the remainder going as far as Esmeraldas on the south. Thus by these magic means they were able to destroy all the former inhabitants of the region and to render it habitable to themselves.

On the return of the shamans to Pueblo Viejo, all the Cayapa moved down to the Rio Cayapas, which region

in large measure they found to be the same as it is now; but the Cayapa did not take possession of the former territory of the Indios Bravos until conditions had first been more or less changed. For instance, while the Indios Bravos had fields of plantains and bananas as do the Cayapa at present, they were not utilized directly by the conquerors, but the roots were dug up and replanted. Similarly all other products of the labor of the Indios Bravos were changed, thus removing any danger to the Cayapa from using them.

In those days also, the sabalo, the fish most prized by the Cayapa, existed only in the main streams of the rivers: it never came into the small esteros as it does now. On going into the country of the Indios Bravos the Cayapa placed near the mouth of each estero a row of palm-wood posts which had the magic power of rising from the ground to their full height during full moon and of sinking into the mud out of sight during the dark of the moon. These posts are said to have had a direct effect on this particular species of fish and on their passing up and down the estero. Some of these posts are said to be found even now at the mouths of certain esteros.

There are, of course, no means of fixing the exact date of the migration of the Cayapa either to Pueblo Viejo or to their present location, and their tradition cannot be taken too literally. However, it seems probable that the essential features of the tradition in large measure are based on historical facts.

Whatever the reasons for their move, and whatever

the means employed to accomplish it, the advantages in this new location over their former mountain habitat resulted in greater ease of agriculture, improved conditions for growing plantains, facility of travel on the river, and proximity to the sea. The change from their former life, which was that of a village community of mountaineers with maize as the staple food, was very considerable. They at present live scattered along the banks of the rivers, each family keeping to itself in large measure, but they still preserve a semblance of their former village life in the three pueblos, Punta Venado, Sapayo Grande, and San Miguel, each of which is a common meeting place for its particular division of the people.

The provincial and national governments recognize, in a way, the rights of the Indians to full and peaceable possession of their territory, and have endeavored to protect them by enacting laws prohibiting the settlement of other peoples along the Rio Cayapas and its tributaries. The enforcement of these laws, however, has been quite another matter, for the negroes, descendants of former slaves of Colombia and Ecuador, in later years have gradually worked their way up the streams until now their houses extend as far as Corriente Grande. Formerly Cayapa houses were found as far down-stream as Borbon, at the confluence of the Cayapas and Santiago rivers, but at present the house farthest down-stream is only a short distance below the confluence of the Rio Onzole with the Rio Cayapas.

As for the white population of the entire Province of

Esmeraldas, and especially of the drainage of the Rios Santiago and Cayapas, it is decidedly in the minority; indeed at present there is only one white family living on the course of the Cayapas.

The desirability of the intrusion of another race into a territory occupied by Indians is always doubtful. In this case it is especially so, for some of the negroes at all times take great liberties with their Indian neighbors, not to mention the fact that they openly plunder their crops and houses whenever opportunity offers. These depredations the Cayapa tolerate, rarely taking a hand themselves in the punishment of the offenders, and never committing acts of reprisal. They are a law-abiding people, and recognize completely the authority of the provincial government over all inhabitants except themselves. Any such acts, if they were to occur among themselves, would be severely punished in their own way and without governmental aid. Be it said to the credit of the provincial authorities, that they recognize the right of the Cayapa to govern themselves and to punish their own offenders, and further that they attempt to protect the Indians from impositions by others. However, it frequently happens that the guilty ones either escape or, if apprehended, are inadequately punished.

As above mentioned, all ordinary depredations, such as theft by outsiders, are tolerated by the Cayapa without personally attempting to punish the offenders. There is one crime, however, which demands a severe penalty, namely, outrages against women. The standard of

ethics is very high among the Cayapa themselves, and any case of unfaithfulness, if such were to be discovered among themselves, would be most severely dealt with. About 1897 or 1898 two negroes came to a Cayapa house, drove the men away, and took possession of the premises with the women occupants. On the following day the chief sent down the river a commission which conveyed to the local *teniente politico* at La Tolita the heads of the negroes, carefully wrapped in leaves of the *hoja blanca*, as well as the compliments of the chief, and with an explanation as to the reason why the heads had been separated from the bodies. Incidentally the explanation conveyed the intelligence that future offenses of this kind would be punished in like manner. The *teniente politico* was requested to forward to the governor at Esmeraldas the two heads and the above message, but owing to the rapidity of decomposition in the tropics, it was deemed best to give the governor the benefit of the message only. Fortunately for all parties concerned the governor's reply, it is said, was a complete vindication of the action of the Cayapa. So far as could be learned, no similar crime has been committed since that time.

DAILY LIFE

The social organization of the Cayapa has a strictly family basis, although according to their own traditions they formerly lived, when at Ibarra and Pueblo Viejo, in village communities. At present each family regularly lives entirely separated from every other family, and usually at a considerable distance from its nearest

neighbor, though occasionally two or three houses may be within sight of one another along the river. In no case, however, is there an approach to communal life, each family forming an individual unit with family property-rights. There is, to be sure, a central government, the head of which is an hereditary chief, or *gobernador*, as he is at present called after the Spanish fashion. The purposes of this central government are strictly those of preserving law and order, settling controversies between individuals, and punishing infringements upon recognized social customs. In no case is there any interference by the central government with property or other recognized family rights and privileges.

A family, as the term is here used, consists of husband, wife, children, and dependents. By dependent is meant not necessarily one who is supported by the others, but one not having a house and a family of his own and who may choose to reside with some family, usually a closely related one. These dependents are usually newly-married sons or daughters, or are parents, grandparents, or other relatives of the head of the house or of his wife.

The daily life of the Cayapa is a busy routine for all members of the household, especially the women. In addition to the cooking, keeping the house in order, and attending to the wants of the smaller children, the mother of the household is kept busy spinning, weaving cloth, and making baskets, mats, fans, and pots, to say nothing of the work she does in the care of the crops and the gathering of the wild foods.

At an early age the girls are instructed in household duties of all kinds, and often begin to spin and weave, as well as to make pottery, basketry, and other articles, at the age of five or six years. They also take a hand in agriculture when very small. As they grow older and become more proficient in these various arts, they enter more and more into the regular daily work of the home, until they finally marry, which they usually do at an early age, often at about seventeen or eighteen years.

The daily life of the men is also a busy one. They do their share of the work in the fields, besides being industrious hunters and fishermen. They are expert woodworkers, making very excellent canoes, paddles, benches, images used as toys by children, musical instruments, certain cooking utensils, and various other objects of wood. They make and tend the fish corrals as well as set the seines when the water is in a favorable condition to divert fish to certain places. In addition to trapping and netting fish, they also do much fishing with hook and line. They hunt a great deal and procure a very important part of the food supply in that way, for the jungle abounds in many kinds of game. When about the house, they are, like the women, almost always busy at something, as adzing a canoe, weaving a net, or doing some one of the many kinds of work which fall to the man's lot in the Cayapa division of labor. Since the introduction of needles and thread among the Cayapa, the men have taken up sewing and have become very efficient tailors for their simple needs.

The women do all the spinning and weaving of cloth, but the men sew all garments, not only for themselves but also for the small boys who have not yet learned to sew. This is due largely no doubt to the fact that the single garment worn by the women requires no sewing whatever, while the two garments worn by the men must be sewn.

At a very early age boys begin to learn the arts practised by their elders, hence they are instructed in hunting, fishing, woodworking, and similar useful accomplishments of the men.

It is customary among the Cayapa to arise at dawn, usually between five and five-thirty o'clock, and to retire as soon as darkness comes, or between six-thirty and seven o'clock. These hours vary little throughout the year, owing to the proximity of the equator.

The daily routine is usually about the same throughout the year, varying in event of a fiesta, or boda, which brings the people together at a particular village, from which, after some days of festivities, they return home. Another diversion is going down the river to the settlements. Sometimes this trip is made almost purely for pleasure and to obtain oysters and other sea foods, but more often these pleasure trips are combined with the selling of tagua, cacao, rubber, or plantains, and occasionally logs for lumber.

One of the most characteristic features of the daily life of the Cayapa is the devotion of the members of a family toward one another, especially that of parents toward their children. Few restrictions are placed

upon the children, and punishment is very rarely necessary. The children usually play together amicably, and the considerate care given by elder children to their young brothers and sisters is especially noticeable. The agriculture practised by the Cayapa requires a great deal of labor in connection with the various crops, especially plantains, sugar-cane, and cacao. In this cultivation the whole family joins, the children, even when very small, cheerfully doing their share in clearing away the weeds and brush that grow so rapidly in the tropics, and in harvesting the crops.

The children have various amusements, though no games in the ordinary sense of the term. They have several kinds of toys. Musical tops, such as those shown in pl. LXXXV, 2-5, made of gourds and certain large nuts, are much used. Wooden dolls of various mammal, bird, and human forms, such as those shown in pl. LXXXIV, are also much used. They have toy canoes varying from a few inches to several feet in length, and toy paddles for use with them. These canoes and paddles they use a great deal, especially when swimming, which is a very common and healthful amusement among both sexes.

The children are trained to this canoe life from infancy, and one of the first toys of a child is a paddle. At a very early age children are instructed in its use, so that even at the age of five or six years a child can take a small canoe and paddle along the river for short distances.

The children also play with small baskets, fans, mats,

pots, and wooden and stone implements, made by themselves or by their elders especially for them. They construct play-houses after the fashion of dwellings, and often make small fish corrals like those used by their elders. The boys also make toy fish-nets and gigs, and still use the blow-gun as a plaything, although this old type of hunting weapon is now rarely used by the men.

The nearest approach to a game among the Cayapa, either among the children or among the older people, is that which the boys play with their musical tops, although this is not at all a game of chance. The floors of the Cayapa houses, being made of undressed palm-wood, are always too rough for the spinning of tops, and the ground is always too wet. Therefore, to provide a spinning surface, a large mat is spread upon the floor, or a manta or other piece of cloth is stretched tightly over the legs of a boy seated flat upon the floor. Then he, with usually another boy, spins the tops in opposition one to another, the point of the play being to see what top can knock the other from the spinning surface. There is no scoring in this amusement, and the whole pleasure of it is derived from the spinning of the tops and especially from watching them collide with one another. Often two boys are able to keep four or five tops spinning at the same time, so that their collisions create a lively scene and furnish much pleasure to the onlookers as well as to those engaged in the spinning. The spinning is usually done with the hands alone, although sometimes, if a very rapid

motion is desired, a string with a grip is used. Occasionally a girl may be seen spinning a top, but it is primarily an amusement of the boys.

MATERIAL CULTURE

BUILDINGS

The buildings of the Cayapa may be divided into four classes: the dwelling or regular abode, the rancho or temporary structure, the cane-mill and distillery, and the church, this last, of course, being of modern introduction. All these buildings, except the church, which is at ground level, are pile structures and are constructed according to a single general plan.

In pls. I-IV are shown typical dwellings. They are always rectangular in ground-plan (pl. XI), and vary in size according to the number of occupants, some reaching large dimensions. The dwelling of which the above-mentioned ground-plan is presented is 87 feet in extreme length and 41 feet in width. Dwellings are almost invariably situated along the river bank, and each is flanked by fields of sugar-cane, plantains, bananas, cacao, pineapples, and other crops. The dwellings are raised four to twelve feet from the ground, and access is gained by means of ladders such as those illustrated in fig. 1, especially those of the types shown in *a* and *d*.

The houses are fairly simple in construction. The framework consists of a number of heavy squared posts of a hard black wood called by the local Spanish name

guayacan, in which notches are cut at the level of the floor (pl. XIII, *b*) to hold the stringers that support it. The tops of these posts are also notched for the beams that support the superstructure. The sides of the

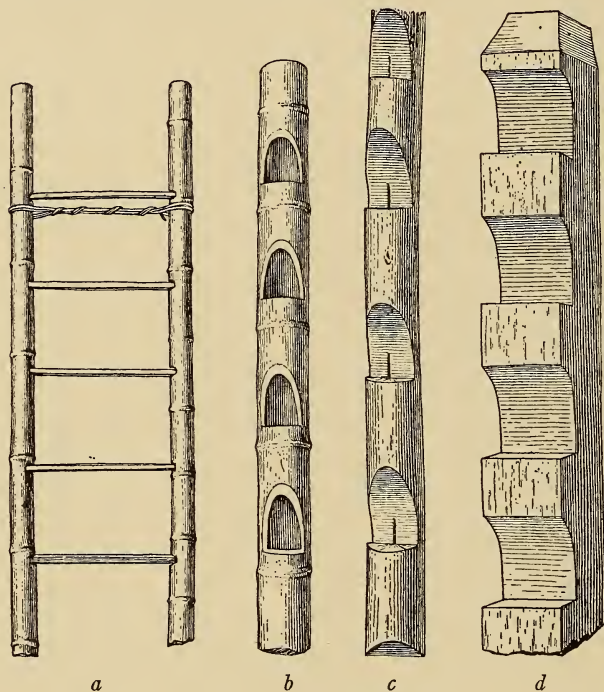


FIG. 1.—Types of ladders

building are entirely unenclosed. The roof is steep and is thatched with palm leaves. Sometimes a single roof covers the whole building, as in those structures shown in pls. II, VII; but upon the larger buildings it is ordinarily in two parts, as indicated in pls. X, XI. While the floor in such a structure is continuous, the presence



DWELLING AND ADJOINING CANE-MILL



DWELLING SHOWING ROOF EXTENSION AND BAMBOO RIDERS

of these two roofs serves to separate the building into two parts: one for the general living and sleeping room, the other for cooking. The structure is thus given the appearance of a double house, although the floors of the two rooms are always at the same level and the house is a unit in every respect except the roof. The double roof serves to exclude the smoke, which rises from the open fire-box in the kitchen, from the living and sleeping room. This division of the roof results in two inner gables, the eaves of which are brought within the area of the house itself (pl. XI, *h, i*) and under normal conditions would allow the rain-water to fall upon the floor. To prevent this, a large eaves-trough is made by hollowing out half of the long trunk of a species of palm locally called pambil (Cayapa, *bū'ĩñ-tcī*). The roof always projects a considerable distance beyond the edge of the floor, so that rain-water from the eaves falls at a distance of at least three or four feet from the sides of the building, and the eaves extend far enough down to prevent the wind from blowing the water back on the floor. As before stated, the ordinary dwellings have no sides, but their place is partly taken by a more or less elaborate railing, such as that shown in pl. V, which lessens the danger of one accidentally falling from the elevated floor. Raised platforms are frequently constructed at one or more points along the sides of the building. Such platforms are from four to ten feet in length and from four to seven feet in width, as are those shown in pl. XI, *c*. The roof is correspondingly extended to cover them. These platforms are raised usually

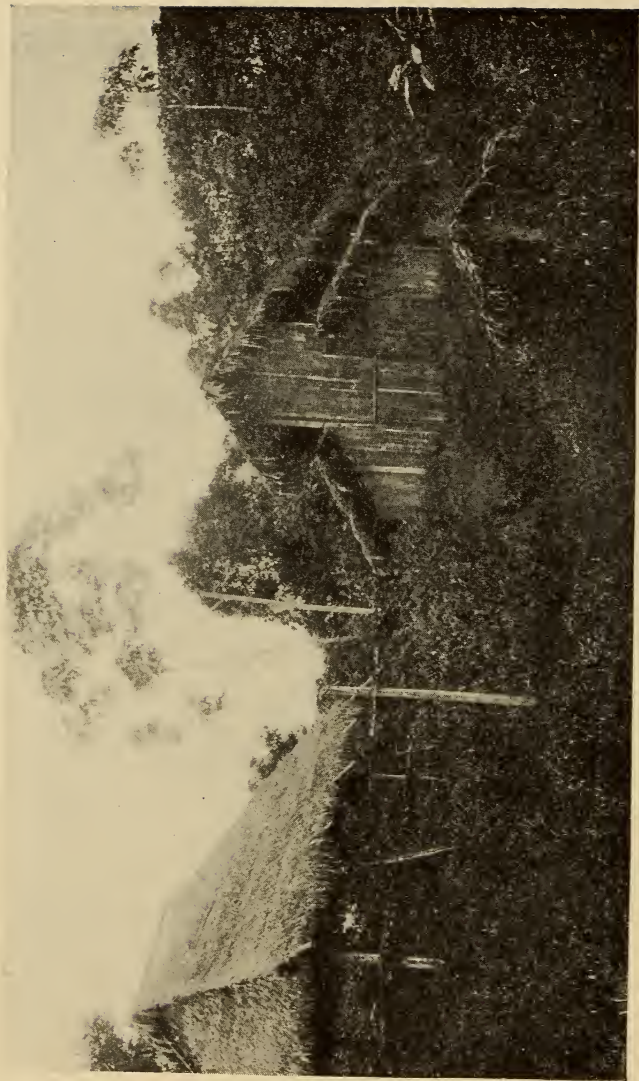
from four inches to a foot above the level of the main floor, and are most frequently used as sleeping platforms or as storage places for various articles.

In this region where the rainfall is so great and where the sun rarely shines, one of the serious problems is that of keeping clothing and other articles dry. To accomplish this, there is constructed at one side, usually at the rear of the house, or behind that portion in which the fire-box is situated, a drying platform, constructed of large bamboo stems laid side by side, without a roof, and ordinarily on or nearly on a level with the main floor. The convex surface of the bamboo permits the water falling upon it to drain readily to the ground, while the impenetrable outer surface of the bamboo permits no rain to be absorbed by it. Thus, in a few minutes after a rain, this raised platform is usually dry enough to permit the spreading upon it of clothing, or of mats for the drying of cacao. At one side of this drying platform is placed a horizontal bamboo pole, usually as long as the platform and raised six or seven feet above it, for use in drying large fish-nets.

On the rafters of the house, and hence high up in the interior, is constructed a platform, or loft (pl. XIV), usually of bamboo, which is used for the storage of old utensils, food, and articles not in daily use. Ordinarily this storage loft does not cover a space equal to more than one-quarter that of the floor of the house itself, and frequently it is much smaller, although always of sufficient capacity to accommodate all the surplus stores of the family.



TYPICAL DWELLINGS ALONG THE RIVER



PRIEST'S HOUSE AND CHURCH AT SAPAYO GRANDE

In pl. XI is shown the ground-plan of one of the largest of the Cayapa houses. This is the largest of the four dwellings of the chief of the Punta Venado division, and is commonly called "*la casa grande del Gobernador*." This structure is situated on the southwestern bank of the Rio Cayapas, at a point just up-stream from the confluence of the Herradura Grande. The house is occupied usually by at least two families, and can comfortably accomodate as many as forty people if necessary. The structural details of this dwelling are typical of those of Cayapa houses in general, although the others are somewhat smaller. This "casa grande" is 87 feet in extreme length by 41 feet in extreme width. The floor may be divided into two areas by the line *h-i*, which represents that along which the two inner gables meet and where the pambil eaves-trough is placed to prevent the water from running in on the floor. The larger floor area (*a*) is the general living and sleeping room, and is 50 by 35 feet, exclusive of the raised projections (*e*), which extend from six to seven feet in each case. This entire floor area is covered by a single large roof. The smaller area (*b*), about 30 feet square, is, as before stated, at the same level as the larger area, but it is covered by a separate roof, and it is here that the fire-box is situated and where all food is prepared and cooked. The fire-box (*c*) is 6 feet 4 inches by 3 feet 9 inches, and is raised about three feet from the floor. The projection (*d*), about 5 feet 6 inches wide and 19 feet 6 inches long, is at the same level as the main floor, but is made of bamboo. Here

are kept the water calabashes, and the preparation of food is usually done on or near this space. All houses are provided with a similar place for the storage of the calabashes, although in most cases the space devoted to this purpose is much smaller. Unlike *d*, the several projections marked *e* on the plan are raised from four to twelve inches above the level of the floor. They are from 6 to 7 feet in width, and beginning at the lower left-hand corner of the plan, measure $12\frac{1}{2}$, $8\frac{1}{2}$, 15, 13, 11, and 9 feet, respectively, in length. These serve as storage places and are frequently used at night as places upon which to sleep. The inner edge of each of the areas *d* and *e* is, of course, supported upon the stringers of the main floor, but the outer edge in each case is held by two special posts which rest upon the ground and reach to the roof, which naturally must project beyond the main roof in order to cover the corresponding floor projection. These posts are indicated in the ground-plan by small rectangles, and are usually somewhat smaller than those employed to support the main floor. As shown on the plan, fourteen posts are used to support the main floor, the successive posts along each side being placed from eleven to twelve feet apart. The dimensions of these posts in cross-section are usually about six by nine inches. Access to this house is by means of two ladders (*g*), both of the type shown in fig. 1, *a*. In the case of one of them a special projection (*f*), 3 feet 3 inches by 5 feet 6 inches, has been built as a landing at the top of the ladder.

In pl. XIII is shown an elevation of the same house.



DWELLING SHOWING RAILING, IN LIEU OF WALLS



THE CANE-MILL

The essential parts as shown here are the squared house-post (*a*), into the side of which is set, by means of a notch of the type shown in fig. 4, *b*, a stringer (pl. XIII, *b*) running lengthwise of the house. Upon this rest the bamboo poles (*c*) which support the palm-

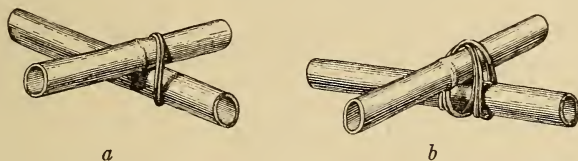


FIG. 2.—Details of frame construction

wood floor (*d*). This floor is at a height of eight feet nine inches from the ground, into which the house-posts are set to a depth of three or four feet. The house-post projects seven feet above the floor level, and at its top is cut another notch of the type shown in fig. 4, *a*, and 5, into which is bound another long stringer,

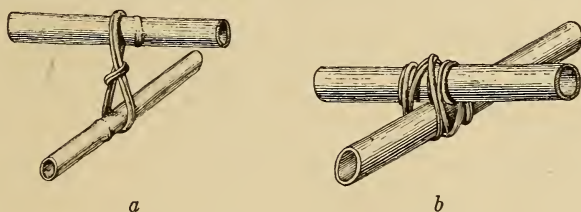


FIG. 3.—Details of frame construction

e, similar to *b*, and which forms the support for the entire superstructure. A corner of such a superstructure is shown in fig. 5, in which the parts are lettered to correspond with those shown in pl. XIII. In fig. 5 the point of observation is within the house. The longitu-

dinal stringer (*e*) projects three or four feet beyond the house-post, and upon this rests the transverse stringer (*f*) which projects about the same distance beyond

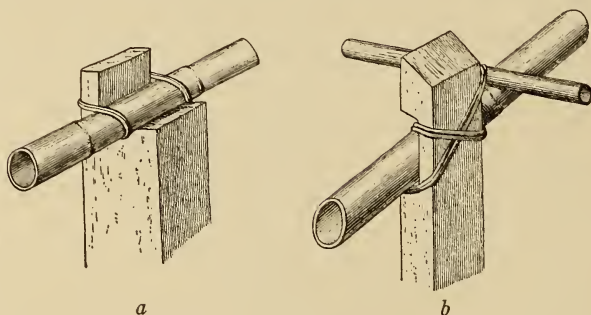


FIG. 4.—Notches for receiving stringers

the former (*e*). Near the end of this projection rests another longitudinal stringer (*g*), upon which rest the lower ends of the rafters forming the side of the roof. In some structures the ends of the rafters of the gable

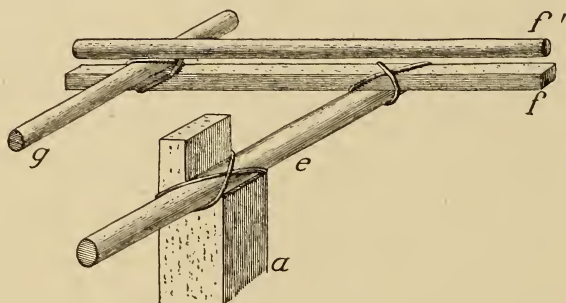
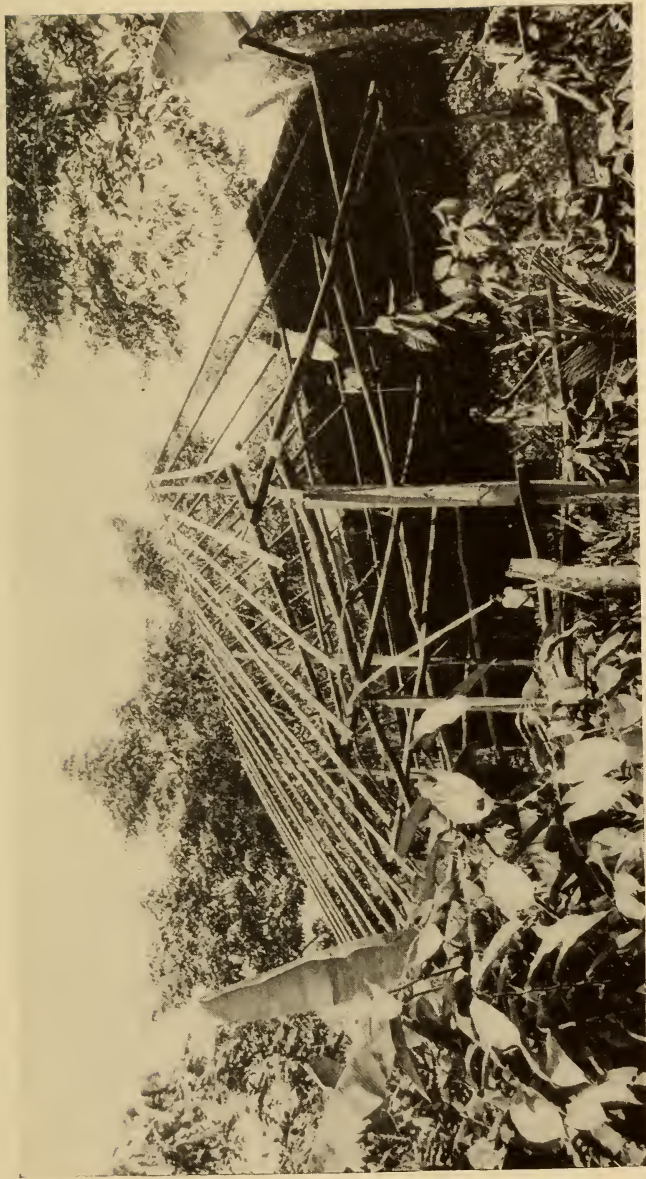
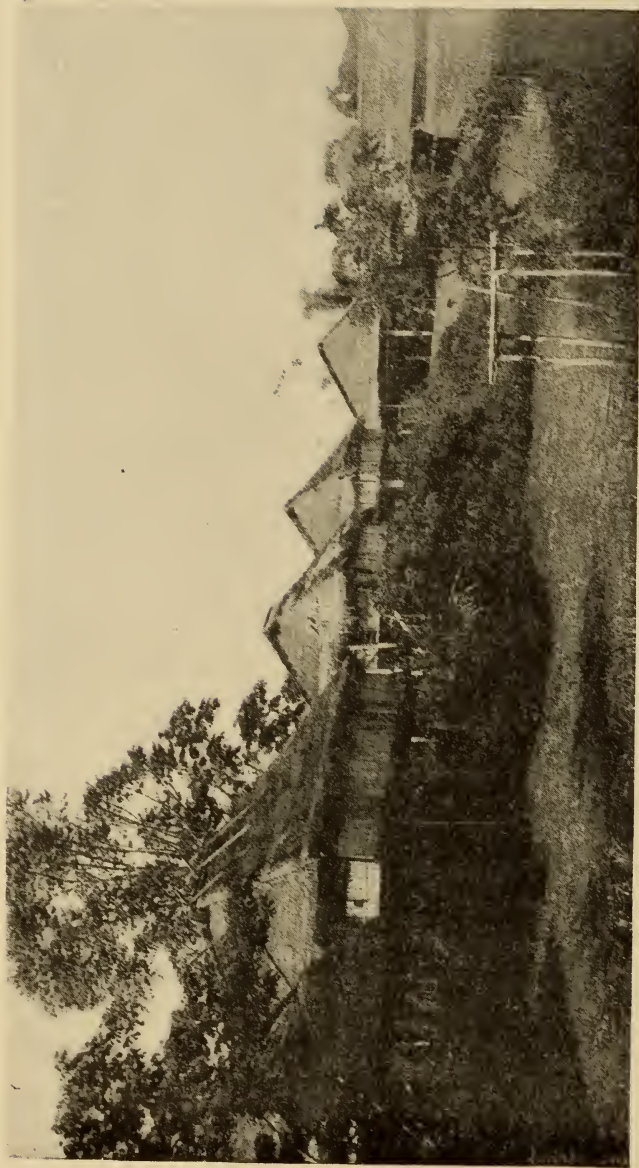


FIG. 5.—Corner of superstructure seen from interior

rest directly upon *f*, as is the case in the large house above mentioned, an elevation of which is illustrated in pl. XIII and also in the unfinished structure shown



UNFINISHED HOUSE, SHOWING ROOF STRUCTURE



in pl. VII. In some other dwellings another transverse beam (fig. 5, *f'*) is used as the support for the gable rafters.

In practically all cases in which two such stringers cross or where a stringer passes through a notch in a post, the parts of such a joint are securely bound together by one or another of the several methods shown in figs. 2-4. The binding material is a durable aerial root, called pitigua in the local Spanish, which is gathered and kept on hand for this purpose and for making certain kinds of basketry. It is kept in coils such as that shown in pl. XCI, 4, and when dry it needs only to be soaked for a short time to render it pliable.

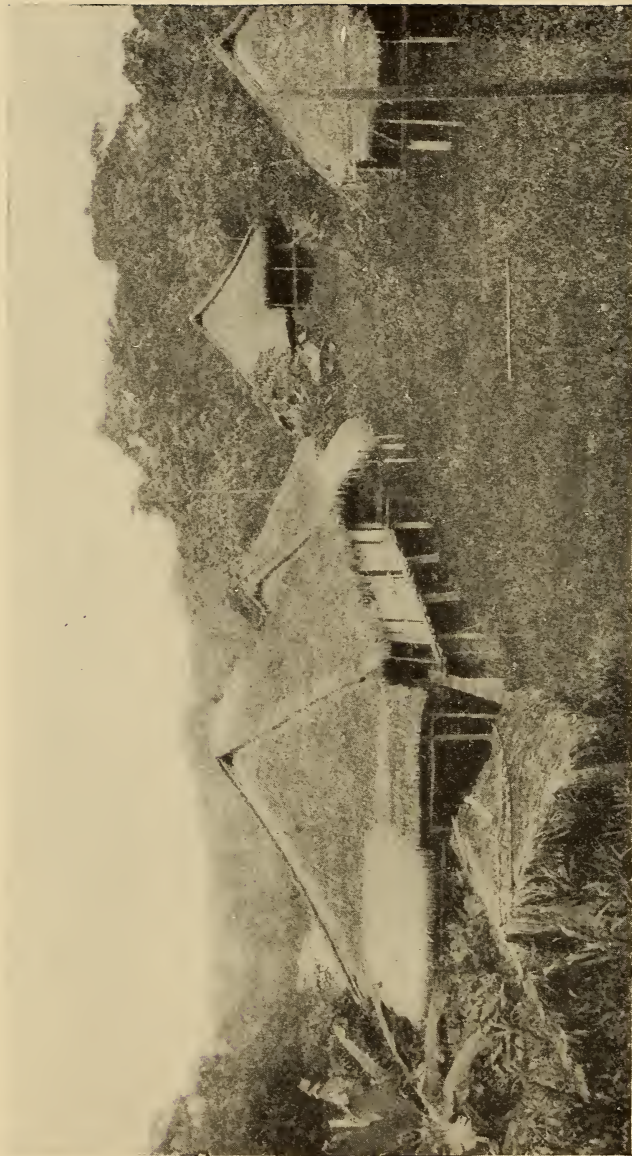
The roof frame of such a building consists of a short central ridge-pole (pl. XIV, *i*), supported by two and in some cases three stout vertical bamboos (*m*) which in turn rest upon a horizontal beam (*j*) running lengthwise through the center of the building. The ridge-pole is of such length as to give the gable roofs a pitch of about forty-five degrees. It varies, therefore, according to the proportionate dimensions of the structure, but is usually from a third to a half as long as the building itself. The bamboos supporting the ridge-pole are, in the case of the large dwelling above mentioned, 13 feet 9 inches in height. The bamboo rafters of the sides of the roof rest directly upon and are bound to this ridge-pole. Those forming each gable are fastened together by means of a palm-wood rod passing through holes near the small upper ends of the rafters. This rod is bound to the two end-rafters of the sides of the

roof, usually at a point two or three feet down from the ridge-pole. The other ends of these gable rafters are spread fan-like along the end beam (fig. 5, *f*, *f'*) of the superstructure so as to produce a complete frame for the attachment of the thatch of the gable. There is thus left at the top of this gable a small triangular opening, such as that shown in pl. x, which serves as a vent for the smoke from the open fire-box. The thatch is so laid on that it projects about two feet beyond the ends of the side roofs, while the thatch on the gable end just meets the underside of this projection. The projection of the ends of the side roofs in this manner prevents the rain from driving through the thatch along the line upon which the side and gable roofs meet, and it is also sufficient to prevent the entrance of rain through the triangular opening at the extreme top of the gable. The slant of the roof, both gable and side, is usually about forty-five degrees. The slant of the gable is regulated by the length of the short ridge-pole above mentioned. This whole construction of the superstructure of such a building is well illustrated in the unfinished dwelling shown in pl. vii.

The covering of the roof is a thatch of palm-leaves, usually those of the tagua, or ivory-nut palm. The necessity for a constant supply of these leaves, combined with the desire to perpetuate the supply of ivory nuts (since these are a source of considerable wealth), has caused the Cayapa to preserve carefully the groves of these palms. Even single palms growing quite apart from others are conserved. The trees, vines, and under-



DISTANT VIEW OF PUNTA VENADO



CHIEF'S HOUSE. SAPAYO GRANDE

growth of the jungle are cut away from time to time around these palms, and about once a year, usually on the occasion of harvesting leaves for a thatch, the crown of leaves is trimmed. Any drooping dead leaves at the base of the crown are thrown away and the thoroughly mature healthy leaves only are selected for the thatch. Thus there remain at the center of this crown a number of young and more tender leaves which serve the needs of the plant itself and prevent damage to it which might otherwise arise from the loss of the mature leaves.

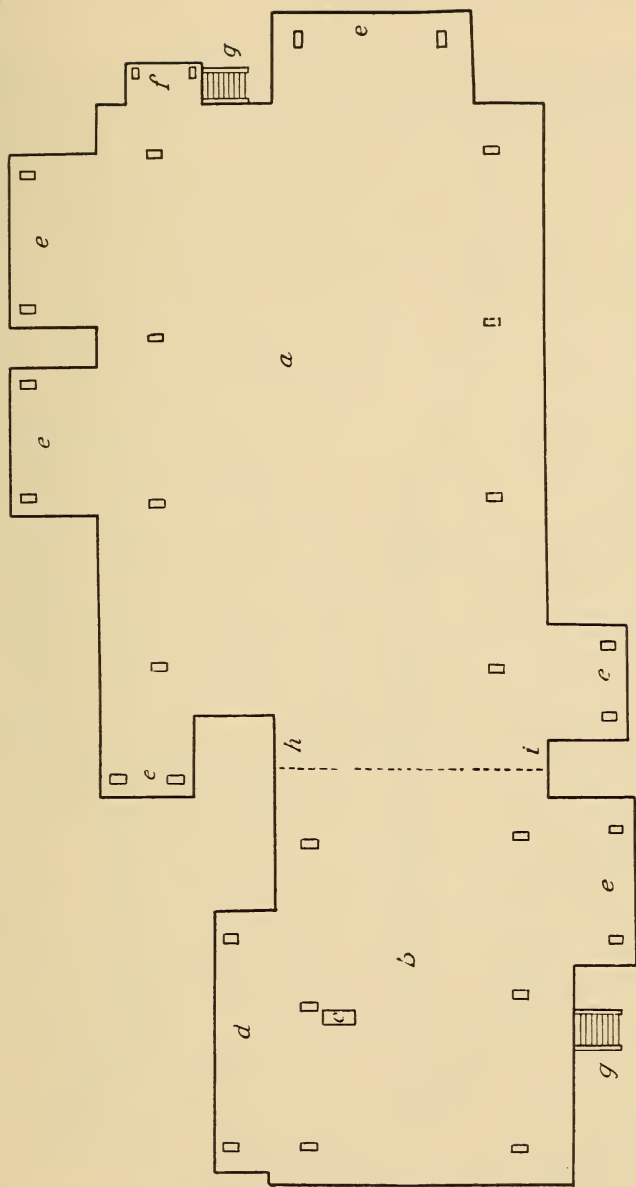
The tagua is a low-growing species of palm, the upper end of the stem, from which the leaves spring, rarely exceeding sixteen feet above the ground. The leaves are therefore easily gathered by means of a short ladder. This, combined with the fact that the tagua produces a very good quality of leaf, makes it almost the only species used for permanent thatch. While several other species of palm produce leaves of durable quality, they grow to such height that it is not expedient in most cases to gather the leaves except by cutting down the palm itself.

The tagua leaves, which reach an average length of about fourteen feet, have stout leaflets extending from the midrib at an angle of perhaps seventy degrees and for a distance of about three feet on each side of the midrib. To prepare the leaves for use, they are split in two along their midribs. Four of these half-leaves are then laid together so that the natural under-surfaces of the leaflets all face the same direction and the midribs are tied together with pitigua at two points.

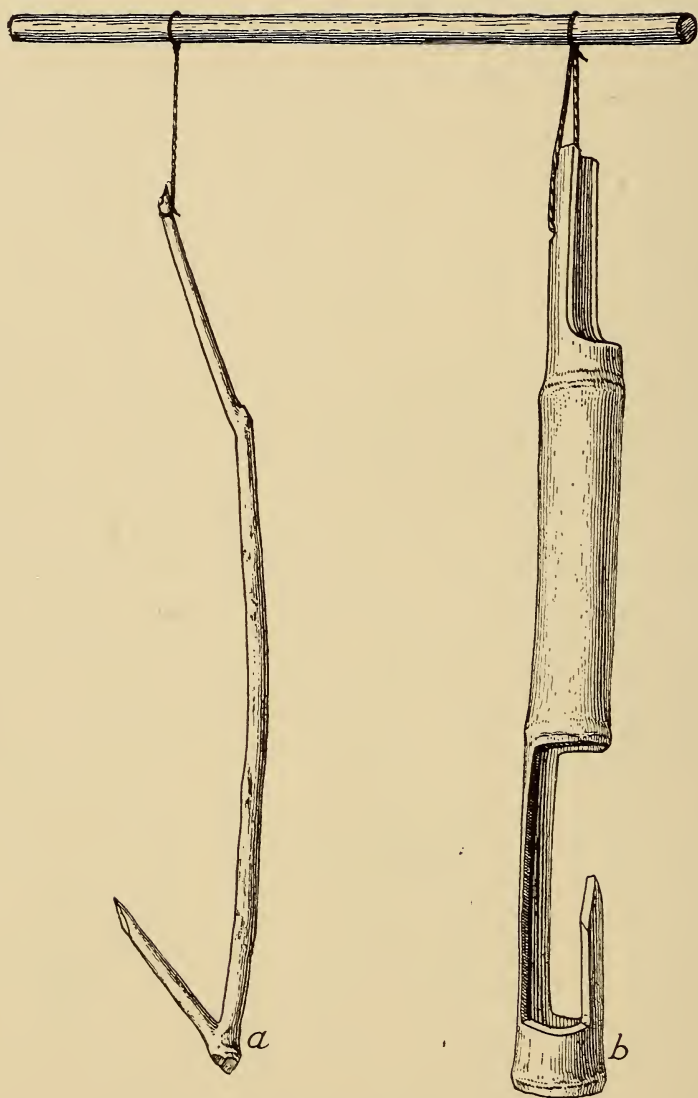
A platform of bamboo is next constructed at an elevation of two or three feet from the ground. The split green leaves, prepared as above, are then placed on this platform and a thatch built over and around them so as to protect them completely from the weather. This is done usually at the place where the leaves are cut, probably more as a matter of convenience than for any other reason, since the leaves when green are very heavy but on drying become very light. They are allowed to season here for at least two months, after which they are transported to the point where they are to be used. In some cases, however, the freshly cut leaves are transported at once to the house for which they are intended and there cured.

This seasoning in a dry place is absolutely necessary, since if the leaves were placed on the roof while still green, the constant rains of this region would soon rot them. It is further claimed that if used when green they are soon attacked by insects, especially cockroaches, which, as before mentioned, are very numerous and troublesome.

The negroes also use the tagua-leaf to a large extent for thatch, and in its preparation they are very strict in their observance of certain rules concerning the phases of the moon. No timber may be felled and no thatch leaves cut in the light of the moon. In the case of timber, it is claimed that it is both subject to the attacks of insects and is rendered much more likely to break or split in working if cut in the light of the moon than if cut in the dark of the moon. Likewise thatch



GROUND PLAN OF CHIEF'S HOUSE



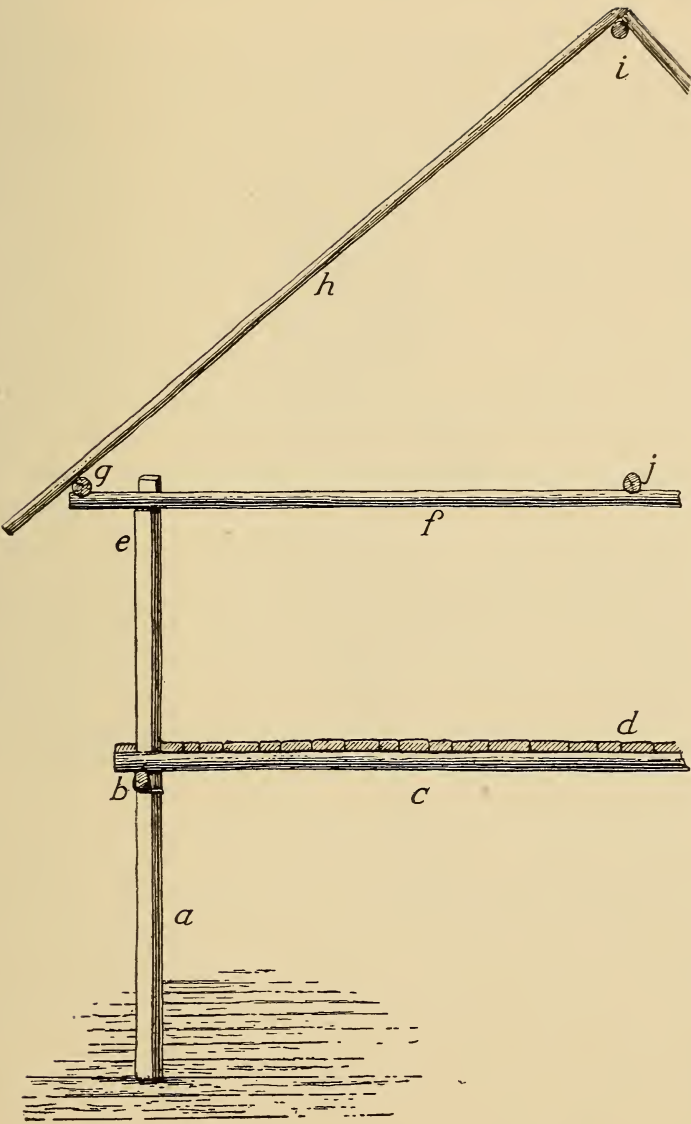
SUSPENSION HOOKS

cut in the light of the moon is practically worthless. The Indians, however, while they have adopted certain of the negro customs, and while they recognize this one to a limited extent, are usually much more governed by necessity and convenience in the cutting of the thatch or the felling of timber than by the phases of the moon. The bundles, or sets, of four half-leaves are applied directly to the bamboo rafters, the midribs of the leaves being quite sufficient to serve as horizontal supports for the thatch. Beginning at the eaves, the bundles are laid in courses in the same manner as are shingles. The natural underside of the leaf is placed uppermost, and the courses are laid with only about six to eight inches of the tips of the leaflets exposed to the weather. Each bundle is securely bound with pitigua, in from two to four places, to the rafters it crosses. By this overlapping process a thick and watertight roof is secured. The leaflets run directly down the slant of the roof, thus naturally tending to conduct the water from one tier of thatch to the next. Further, as above mentioned, the natural undersides of the leaflets are placed uppermost, and each of these leaflets forms a small shallow trough which readily conducts water. The thatch of the large house above referred to and illustrated (pl. XI) is no less than three inches, and in places probably four inches, in thickness. In this structure the northern gable of the section *a* consists of ten rafters covered with fifty-seven courses of thatch. The sides of this section consist of seventeen rafters covered with sixty courses of thatch.

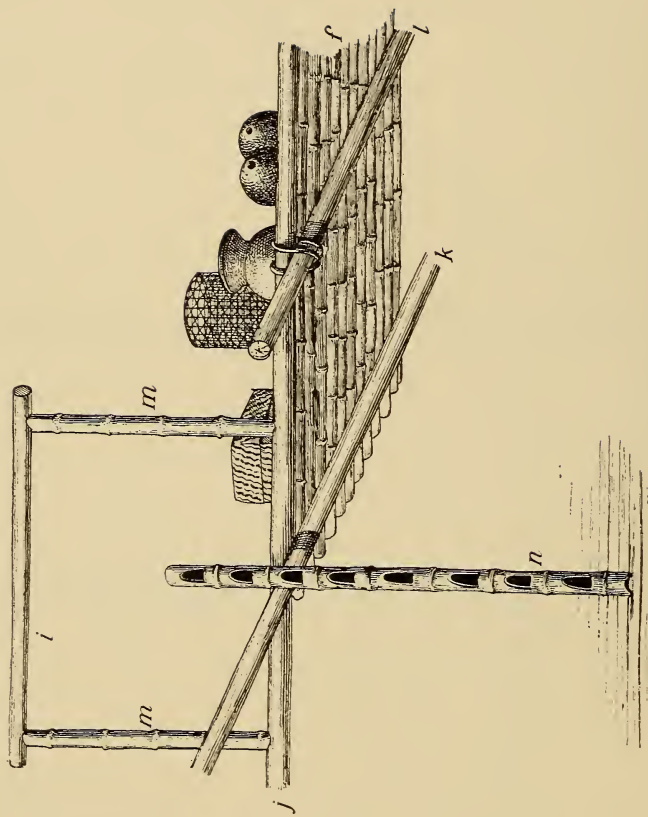
The last courses of thatch covering the side roofs are so laid as to overlap one another and to securely cover the ridge-pole. Further, another special course or two are laid along the ridge so as to guard against any possibility of leakage. Surmounting the roof along this ridge-pole is in many cases a rider made of bamboo and consisting of two or more sets of short bamboo poles crossed at the ridge and extending from three to several feet down upon the sides of the roof. To the points where these sets cross are bound a horizontal pole which serves to tie them together and to form them into a strong unit. Such riders may be seen in pls. II, VIII, X.

Though such a roof is carefully made, it is likely to leak a little from time to time as some small portion of the thatch which was not properly cured gives way or as some leaflets are eaten by insects. Such a leak is quickly and effectually mended by placing a green leaf of *hoja blanca* between the courses of thatch at this point. These tough leaves are from three to four feet long and from twelve to eighteen inches wide, and effectually shed the water. In case, however, a considerable section of the roof becomes leaky, the area affected is re-thatched with *tagua*-leaves.

Buildings of the second class, the *rancho* or temporary structure, are built on the same general plan as are the permanent dwellings, except that they are much more rudely constructed. In place of the well-squared, durable house-posts, bamboo is generally used. Further, in lieu of a thatch of a more durable kind of palm-



DETAILS OF HOUSE CONSTRUCTION



STORAGE PLATFORM OR LOFT

leaf, a covering of the most available material is employed. The material used for this temporary thatch is usually a palm-leaf, but generally of some species of palm which provides a much less durable thatch than that used for the permanent dwelling.

These ranchos serve two purposes almost exclusively, namely, temporary shelters while traveling, and temporary shelters for work which lies too far from home to make daily journeys to and from the regular dwelling profitable. When traveling it is infeasible, not to say dangerous, to sleep upon the ground and without some kind of a roof, owing to the torrential rains which are almost sure to occur during the night, as well as to the danger from poisonous reptiles and other creatures. If, therefore, in traveling, it is impossible to reach a house by night, an early halt is made and a rancho constructed. This is rarely necessary except in case of a long trip over an uninhabited mountain trail, since along the navigable rivers are houses which may be reached in the course of the day's travel. Here the traveler, whoever he may be, is always welcomed according to the custom of the country, the unwritten law of which requires that shelter be given any traveler, whether he be an old acquaintance or a total stranger. When it is necessary, in gathering rubber or pita, in making canoes, or in doing any other work, to journey so far from the permanent dwelling as to make daily travel back and forth unprofitable, a small rancho is built. Such a structure may be used for a short time or for several seasons, it being re-thatched as occasion demands. In the

village of Punta Venado is such a rancho, built with its floor of bamboo resting almost upon the ground. On the other hand, ranchos that are built for regular temporary shelters such as those above mentioned, have their floors raised from two to four feet from the ground. This rancho in the plaza of the village is shown in pls. CXXXII-CXXXIV. In the background of pl. CXXXII and pl. CXXXIII distant views are illustrated, and pl. CXXXIV shows it in detail and indicates its special and interesting use. During one day only of the year is this rancho occupied. At the fiesta held during Easter week the entire plaza is carefully cleared of its dense growth of weeds, grass, and vines, thus making access to the rancho possible. Before dawn on Easter Sunday itself, all dancing in the village ceases. The musical instruments are transferred to this rancho and a procession is formed which brings some of the images of saints from the church to the rancho, where they sit in state, as it were, throughout the day, while music is played before them almost constantly. It is said that this is the one day of the year when these saintly images can drink as human beings, and they are frequently offered guarapo, a calabash of this cane juice being placed to their lips as if they were in the act of drinking. During this time people are prohibited from drinking rum in the presence of the images, though they may drink as much guarapo as they desire.

The cane-mill, which is itself an important and a permanent building, is constructed in exactly the same manner as a regular dwelling. It is usually situated

near the permanent dwelling, and is almost always surrounded by cane-fields. The cane-mill is equipped with what may be termed the mill proper, consisting of a pair of large and very heavy rollers with a large hand-wheel used in turning them, the large storage pots for fermenting the cane juice, and the fireplace and pottery still used in distilling the rum made from the fermented juice. The similarity which such a mill bears to an ordinary dwelling is shown in pls. I, II, in each of which the structure to the right is the mill, and that to the left the dwelling. These two illustrations show also how close together the mill and the dwelling are sometimes built. In pl. VI is shown an isolated mill, with a field of young cane in the background. The dwelling of the owner of this cane-mill, illustrated in pl. V, is situated directly opposite on the bank of the river.

The three classes of buildings described are generally isolated from others. The continuously inhabited dwellings are never assembled into villages, but are scattered at intervals along the banks of the stream. There are, however, within the Cayapa territory, three villages, each consisting of a church and a number of houses. These villages are used by the people only when they come together for religious feasts and on other festival occasions. The houses in these villages are never occupied regularly except at such times, though they are constructed in every way like the dwellings occupied permanently by the people as homes.

The church, which of course is a modern institution, having existed only since the time of the Spanish con-

quest, differs from the other buildings in that it is not raised above the ground and in that it is always enclosed nowadays with lumber obtained from the mills near the mouth of the river. Within the church there is a rude, high altar, with several images of saints; otherwise the building is entirely unfurnished. The front of the church at Pueblo Sapayo Grande is shown in pl. iv, and the fundamental differences in construction between a church and a dwelling are well shown by the contrast between the two buildings in this illustration. The building in the left foreground is the convento, or house of the priest, and is a typical Cayapa dwelling in every respect. The most characteristic features of a church—its lack of piles, its completely enclosed sides, and its roof, the central portion of which is raised some feet above the remainder—are well shown in the illustrations of the church at Punta Venado. This structure, which is the largest of the three churches of the Cayapa, is shown in the background of pl. xxiv and in pls. cxxxii, cxxxiii, cxxxv, and cxxxvii. It is about 80 feet long, 35 feet wide, and about 25 feet high at the ridge of the building. The eaves are about 10 feet above the ground. This building is nearly twice the size of the church at either Pueblo Sapayo Grande or Pueblo San Miguel. Of these two churches the latter is somewhat larger than the former. The church at Punta Venado differs from the other two also in that it has a wooden floor, which, like its sides, is made of sawed lumber. The framework of the church is in all essentials the same as that of a dwelling, except for the fact that the



HARVESTING CANE



YOUTH IN ORDINARY COSTUME



MAN AND WOMAN IN EVERYDAY DRESS



A TYPICAL FAMILY GROUP

greater size of the structure calls for correspondingly larger and stronger timbers and pillars. Furthermore, the fact that the floor is at ground level makes unnecessary the timbers which in the dwelling are required to support the floor.

DRESS

At the present time the everyday dress of the men consists chiefly of two pieces: a very small, tight-fitting clout (pl. CXVI, 1-3), similar in appearance to short bathing trunks, and an improvised shirt made of calico or of gaudily figured bandana handkerchiefs. On special occasions, such as at feasts and other gatherings, a man adds to this a hat of European or of American manufacture; necklaces of beads, buttons, and silver coins; wrist-bands and neck-bands of small white buttons; and decorations upon the face and exposed parts of the body in red, yellow, or black paint. These ornaments are used to some extent also in the everyday life of the people. In pls. LIII-LVI are shown various types of necklaces and neck- and wrist-bands, and in pls. XXXIX-LII are illustrated typical paintings of the face, arms, and legs. Some of the men paint very little, others very elaborately; some wear no necklaces or similar decorations, others wear many such ornaments; and still others bedeck themselves in both manners very profusely.

The small trunk is ordinarily made of the same kind of native cloth as is used by the women in their dress. It is cut from a piece woven specially for the purpose

and containing a sufficient amount of cloth to make two clouts. Each clout consists of two pieces sewed along a seam running up the front and back. The cloth itself is woven by the women, as is the woman's dress or manta; but the sewing of the clout is done by the men, for the women almost never do any sewing for themselves or for others. The fact that the woman's dress requires no sewing may account for her lack of knowledge in this direction. The clouts are made to fit very tightly, so tightly in fact that they make deep impressions in the muscles of the legs. On account of this tightness no gathering-string or other method of fastening is ordinarily required. Occasionally a man is found who makes his clout a trifle looser than customarily, and provides it, on the right-hand side, with a button to hold it in place. This is said by the Indians to have been formerly the universal custom. In recent times, however, the very tight clout has almost entirely supplanted the other form.

The influence on the life of the Cayapa exerted at the present time by modern commerce and its manufactured articles is here again shown by the use of white muslin in the making of the clouts. In fact, at present the muslin clout is almost, if not quite, as common as is that made of the native cloth.

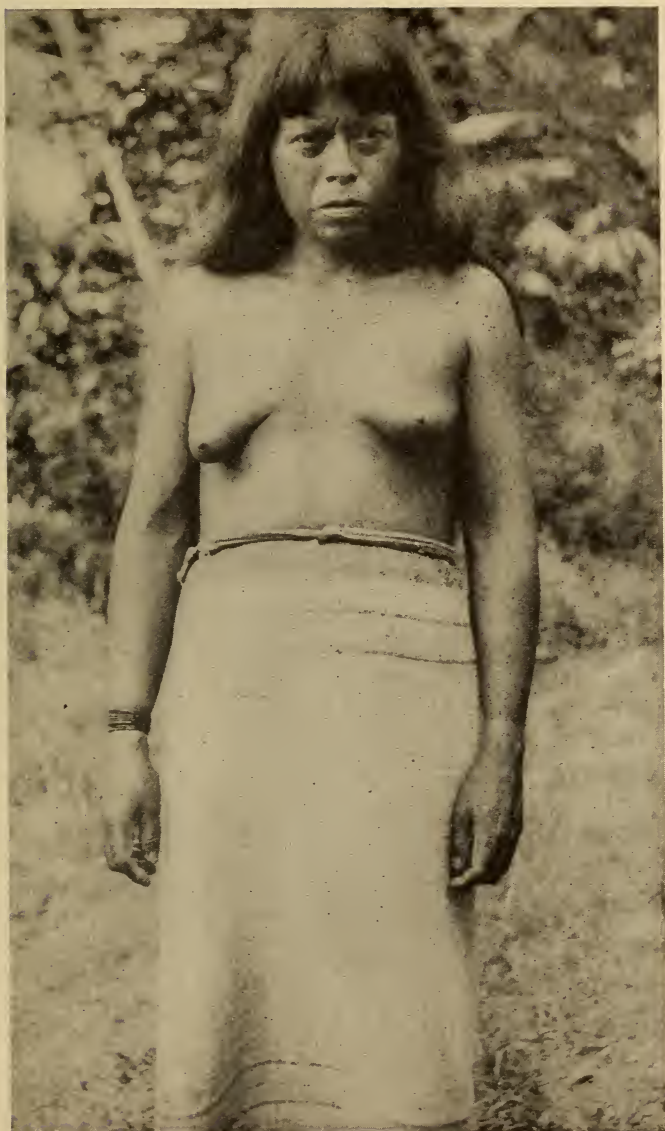
It is said that formerly, when the Cayapa were mountaineers, they used the poncho which at present is so common among the Indians of the interior Andean region. On migrating into the warmer and more humid coastal region, however, the poncho was found un-



WOMAN WEARING NECKLACE AND BRACELETS



WOMAN WEARING DOUBLE MANTA



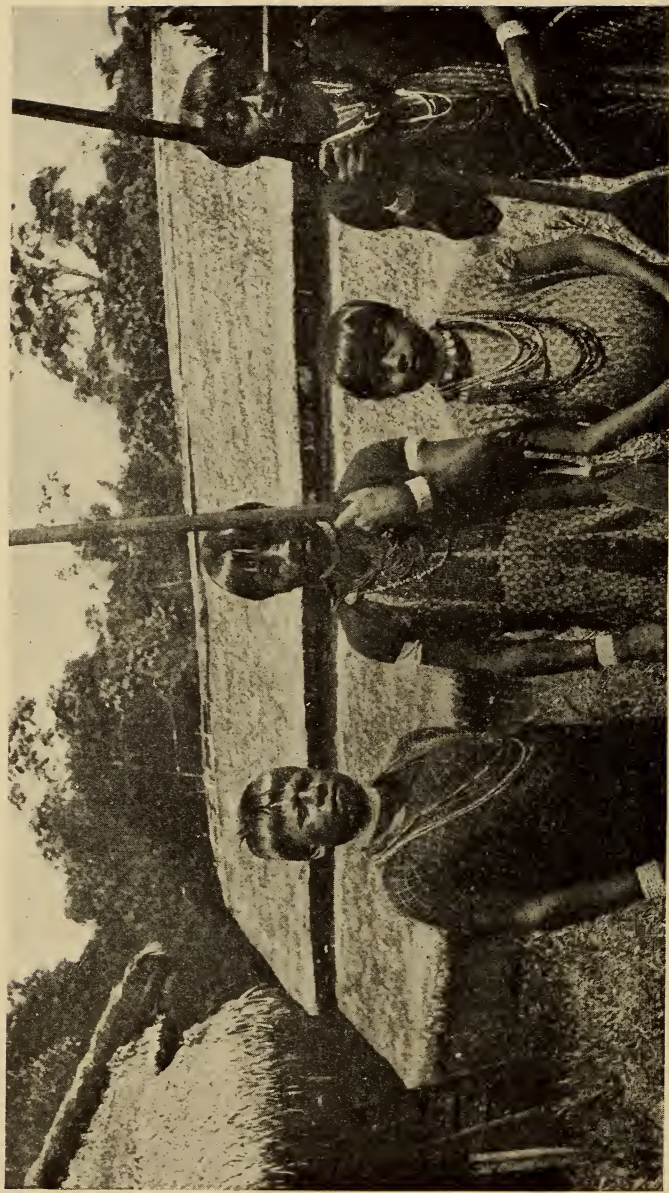
WOMAN'S CUSTOMARY COIFFURE



SINGLE MANTA AND TASSELED GIRDLE



A FAMILY GROUP



FIESTEROS AND CHURCH AT PUNTA VENADO



YOUNG MEN DRESSED FOR FIESTA



A TYPICAL HAIR-CUT



FIESTA COSTUME



FIESTA COSTUME COMPLETED WITH A VEST

comfortable and gave place to the lighter shirt which at present is made of bandana handkerchiefs or of calico. Such garments are worn by the men and boys shown in pl. XXV-XXXVIII. This shirt is made by sewing the cloth into the form of a bag, with an opening just large enough to admit the head, and with two openings at the corners for the arms. At the arm-holes the garment fits very tightly; otherwise it is a very light, loose-fitting shirt which protects to a certain extent the upper part of the body from the strong though diffused sunlight, and, to a much greater extent, from the attacks of insects. Often, when about the house or elsewhere under conditions which make it superfluous, the shirt is not worn.

Both men and women wear necklaces to a considerable extent as a part of their daily attire, and on festal occasions. These ornaments are at present made largely of glass and porcelain beads of various kinds, of small buttons, and of silver coins. In primitive times necklaces probably were as much used as at present, but they were made largely of the seeds of certain plants of the region and from the iridescent wing-covers of a large beetle, *Euchroma goliath*. Necklaces of some of these materials are sometimes still found, but they have been largely supplanted by those made of the intrusive materials described.

In pls. LIII-LVI are shown various neck and wrist ornaments. Those shown in pls. LIII, 2-6, and LIV are made of seeds of various kinds, selected for their sweet scent or for their color. The one presented in pl. LIII, 1,

is of beads and coins; in pl. LV, 1, is shown a necklace consisting of four strands of glass beads, while in pl. LVI, 2, is represented a necklace of beads, coins, and sweet-scented leaves, with two pan-pipes attached to it. A unique type of neck-band is shown in pl. LV, 2, 3; these consist of a woven band to which are attached pendants of haliotis shell. In pls. LV, 4, and LVI, 1, are illustrated a neck-band and a pair of wrist-bands made of buttons, to the former of which are attached a number of coins.

Perforation of either the nose or the ears appears to have been an unknown custom among Cayapa men, hence no nose or ear ornaments worn by men are found. Some of the women at present perforate their ears and suspend from them, as ornaments, small strings of beads or other bright manufactured objects. Neither men nor women ever use native shoes or sandals of any description, nor in former times were hats worn by the men. Subsequent to the Spanish conquest, however, a hat, resembling in form that of the conquistadores, was made from pitigua and used to a limited extent by the men. At present the men use, especially at times of fiestas, the white-man's hat and other wearing apparel obtained from the settlements down the river. Vests and derby hats are highly prized, the former being decorated with buttons, bright-colored yarn, and especially with rows of small silver coins. Those who do not possess vests of the kind made by the whites often improvise a vest-like garment from ordinary cloth. Such a garment is in use by the larger individual seen



FIESTA COSTUME WITH FOREIGN HAT



FIESTA COSTUMES



BOY DRESSED FOR FIESTA



BOY DRESSED FOR FIESTA



FIESTA COSTUMES



FIESTA COSTUME



FIESTA COSTUME



FIESTA COSTUME



BOYS DRESSED FOR FIESTA



BOYS DRESSED FOR FIESTA

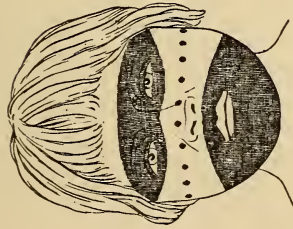
in pl. xxv. These improvised vests are often decorated with small holes in lines or in crosses or other patterns.

The everyday dress of the women consists of a manta, or skirt (pls. cxii-cxv), girded about the waist usually with a narrow tasseled belt (pl. cvii, 1, 2). In addition, necklaces are almost always worn, and ear pendants are sometimes used. This simple attire is also the one worn at feasts and other gatherings, except on certain special occasions, such as dances and church ceremonies. At such times the head and upper part of the body are completely covered with bright-colored calico or with gaudy bandana handkerchiefs; also in canoeing on a hot day a similar covering for head and shoulders is made of black or bright-colored calico, or of handkerchiefs. With this head-covering for canoeing is usually worn a *ma'te*, or hemispherical calabash cap, as a further protection from the sun. The manta, or skirt, above mentioned, is almost always of native fabric, and consists simply of a rectangular piece of cloth sufficiently wide to reach from the waist to slightly above the ankles, and of such length as to pass once and a third round the body. The two vertical edges of the garment are made to overlap at the back, and by pulling from time to time upon the upper corners, the garment is held in place under the narrow woven belt or the pita cord which is sometimes used in its stead. Frequently also over this tightly woven and fairly heavy garment is worn another of lighter material, which passes in the opposite direction about the body, so that the edges overlap in

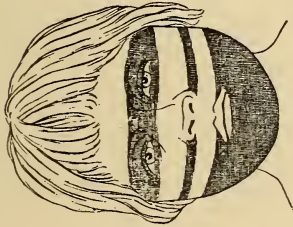
front. In such cases, sometimes the belt is placed outside the two garments, but more frequently it binds the under-garment only, the ends of the light outer garment being merely tucked under the belt at the front. This outer skirt is very frequently of calico or other light cloth, and is in no way essential to the dress. It may, however, be a second manta, and as large and heavy as the main under-garment. In pls. XIX, XXI, XXII, are shown women wearing the single manta; in pl. XX is presented an instance in which a second outer manta is worn with its corners tucked under the belt at the front, and in pl. XXIII the larger of the two girls wears in a similar manner an outer garment made of calico.

Ordinarily, children up to the age of six, and sometimes even up to ten years, wear no clothing at all. Usually, however, a girl begins to wear her manta, and the boy a short calico shirt, at the age of six or eight years; but the boy does not put on a clout until later, often not until about the age of twelve. On the other hand, frequently very small children, even those two or three years of age, are provided with clothing which they wear in imitation of their elders on gala occasions.

Practically the only time that babies are clothed at all is while sleeping; they are then tightly wrapped and bound in cloth, but without a cradle-board or a basket. They are placed crosswise in a hammock provided with a mat or a piece of bark cloth to hold it open and thus to form a kind of cradle. At one side of the hammock is attached a long braided string, made from the young leaf of a certain species of fan-leaf or from an ordinary



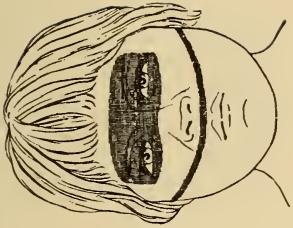
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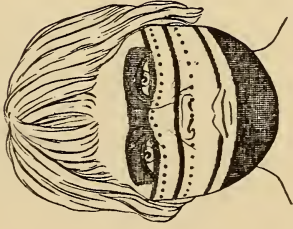
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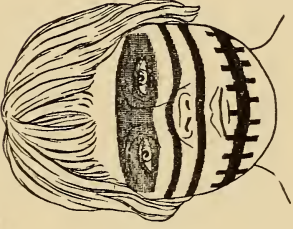
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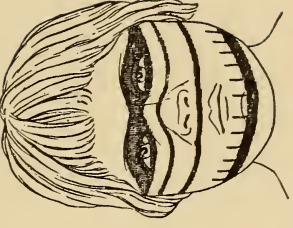
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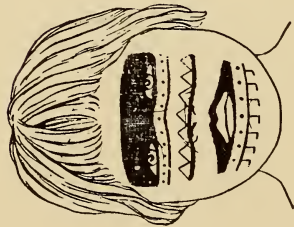


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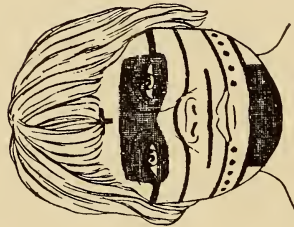


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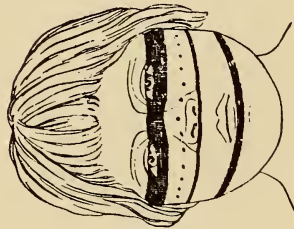
FACE PAINTINGS



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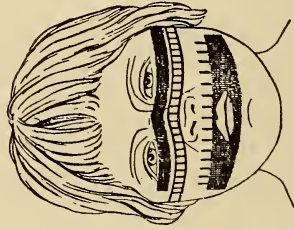
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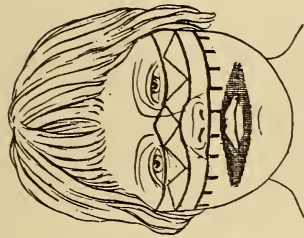
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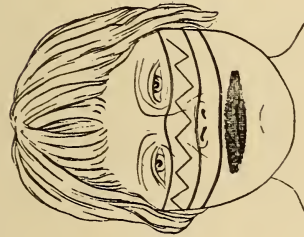
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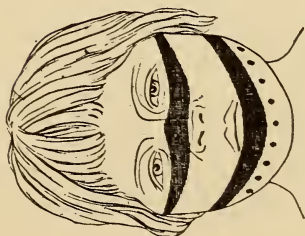
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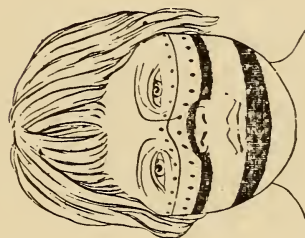
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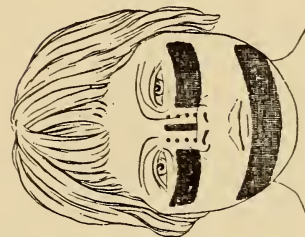
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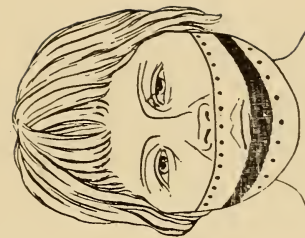
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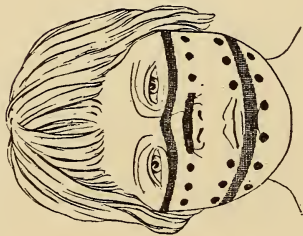


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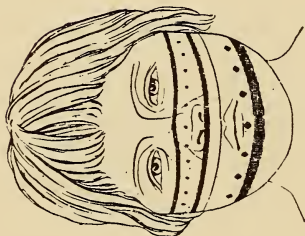


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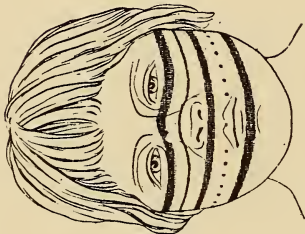
FACE PAINTINGS



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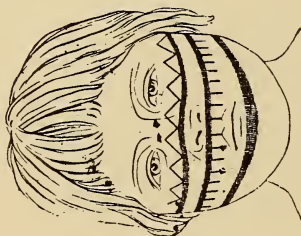
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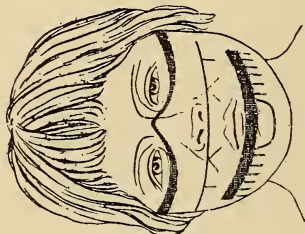
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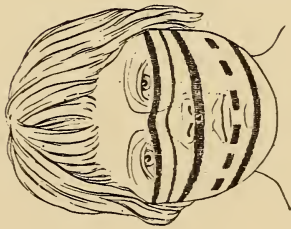
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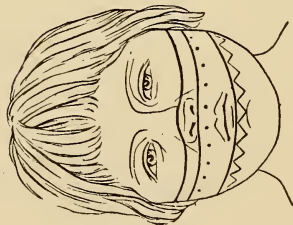
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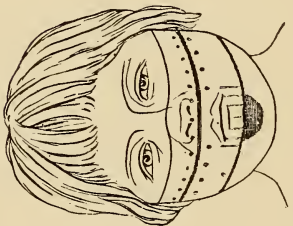
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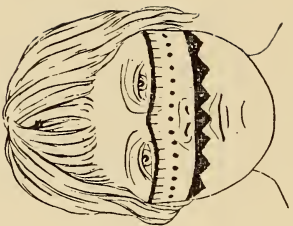
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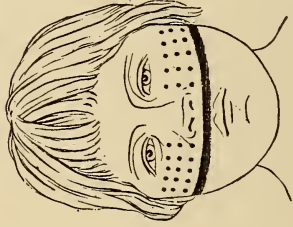
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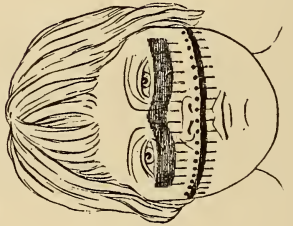
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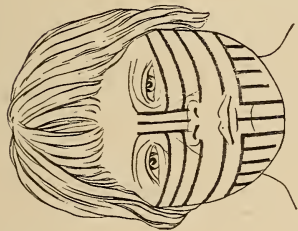
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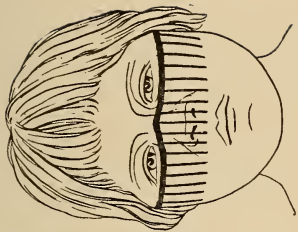
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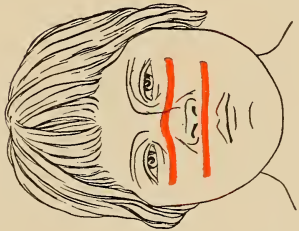
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FACE PAINTINGS



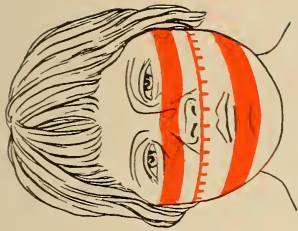
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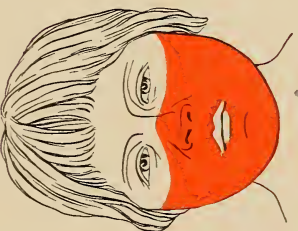
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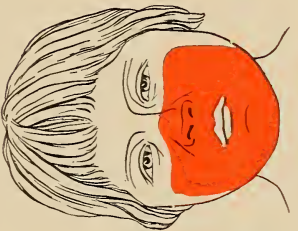
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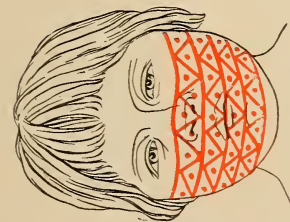


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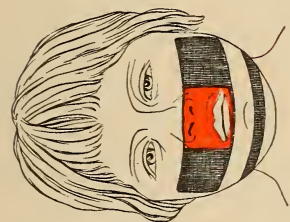


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FACE PAINTINGS



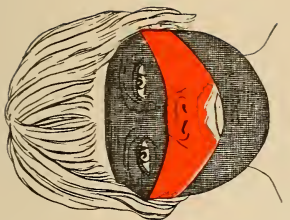
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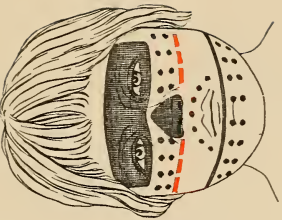
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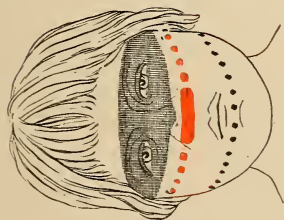


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FACE PAINTINGS



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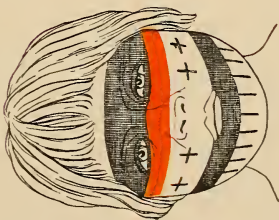
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FACE PAINTINGS

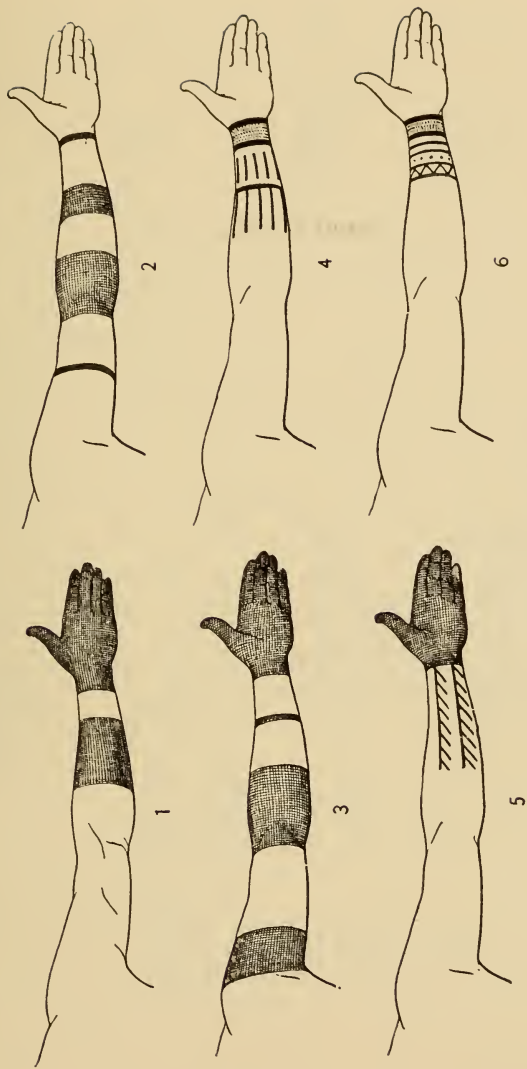
twisted string of pita, by means of which one of the older members of the family, while performing some other task, keeps the hammock swinging.

Aboriginally both men and women wore long loose hair, without braiding or other special mode of dressing; but now long hair is worn only by the women, the men keeping their hair cut short. Some of the women cut the front hair even with the eyebrows, otherwise their hair is never cut, nor is it dressed in any special fashion, being simply parted in the middle and allowed to fall loosely over the back and breast. The only time that the hair is ever worn otherwise is when a woman is engaged in some very hot work; it is then often coiled up on the head or tied in a large knot at the back. The hair of little girls is never cut, but that of boys is cut when they are very young. As a rule the men have no special mode of dressing the hair; it is simply kept cropped to an even length all round, and is allowed to grow from the crown straight down in all directions, without parting or other training. Now and then a man may part his hair in the middle, but this practice is exceptional. These styles of hair-dressing are shown in pls. XVI-XXXVIII.

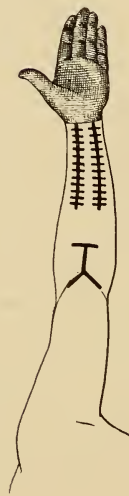
A characteristic feature of Cayapa life is the custom of painting the face and other exposed parts of the body with red, yellow, and black pigment, and in many different designs. The red and yellow pigments, called in Cayapa *mū'* and *la'mū'* respectively, are derived from the seed-pods of a small shrub known by the colloquial Spanish name *achote* and by the Cayapa name *can-*

yū'ñ-tcī. This 'achote is of two different species, almost identical in general appearance. The seeds of one are surrounded with a yellow covering, those of the other with a red covering. When ripe, these pods are gathered, the seeds removed, and the color drawn off by soaking the pods in water for a considerable length of time. This red or yellow liquid is then boiled down to a pasty consistency and mixed with any fairly hard fat, such as lard or the fat of the jaguar, the puma, or other wild animal. It is said that the viscous milky juice of a species of tree called sande is sometimes used instead of one of these fats; but the paint produced with it is not so good as that in which the fat is used. This strong, greasy pigment is applied with either a small pointed stick, if small dots or narrow lines are required, or with a wide carved stick called mōpītcpaī'pa (pls. CXXI, CXXII) if a wide line is desired or if a considerable surface is to be colored.

The black pigment, called ma'lyū, is obtained from the fruit of a tree called ha'wū. This fruit, which is globose in form and from two to three inches in diameter, is gathered while green and cut in halves. The seeds and the inner fleshy parts are then extracted and ground to pulp upon a mealing stone such as is used for grinding plantains. At the same time there is ground into the pulp a quantity of charcoal, and the result is a thin black paste. When dots and narrow lines are desired, this paste is applied to the skin with a small stick tipped with cotton; but when a wide line is to be made, it is applied with a finger.



ARM PAINTINGS



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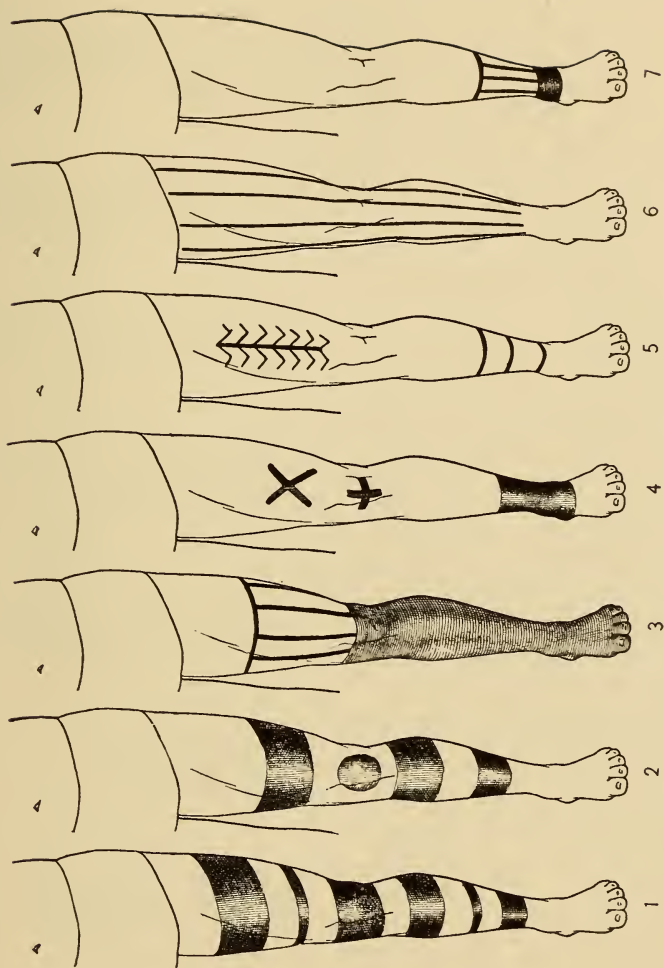


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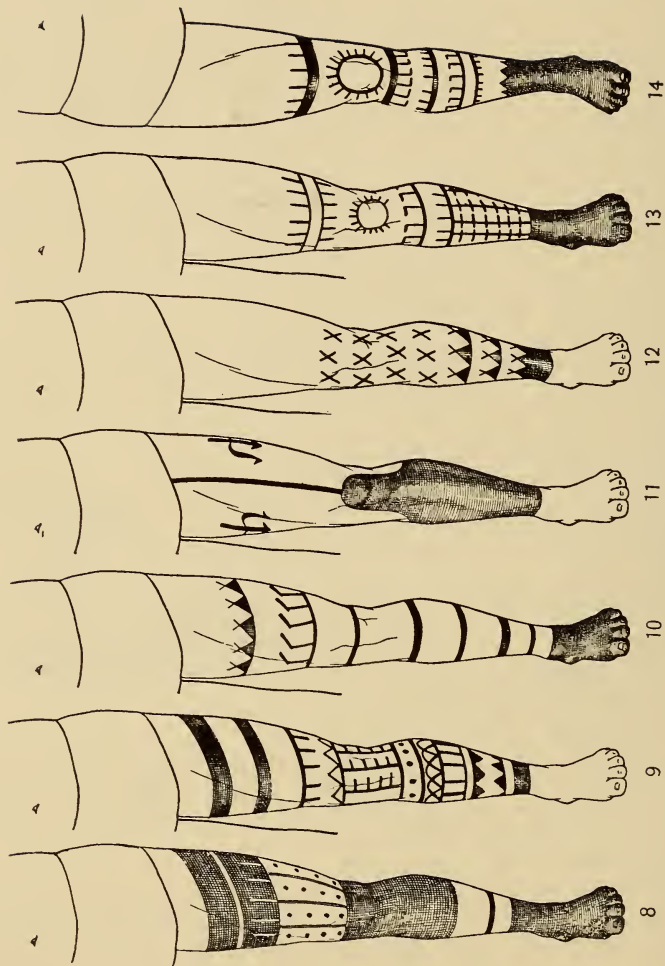


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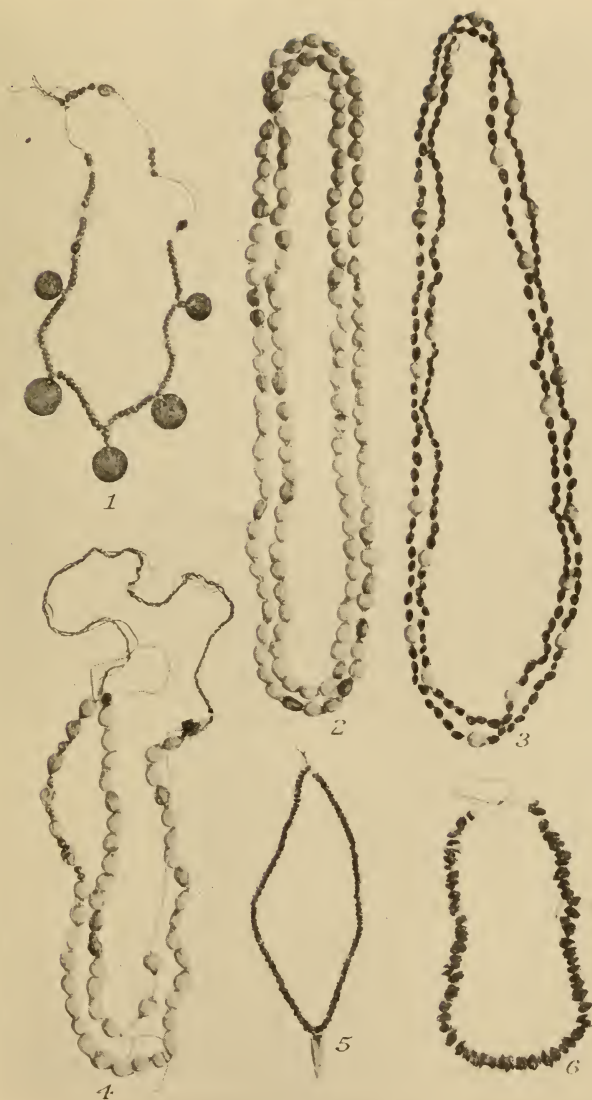
ARM PAINTINGS



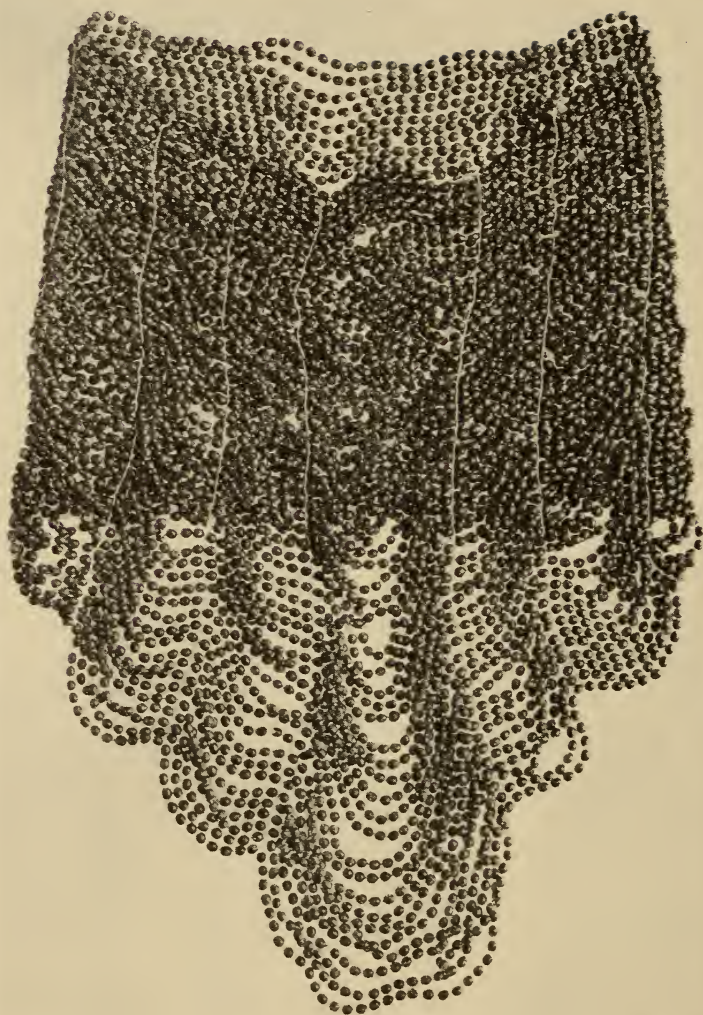
LEG PAINTINGS



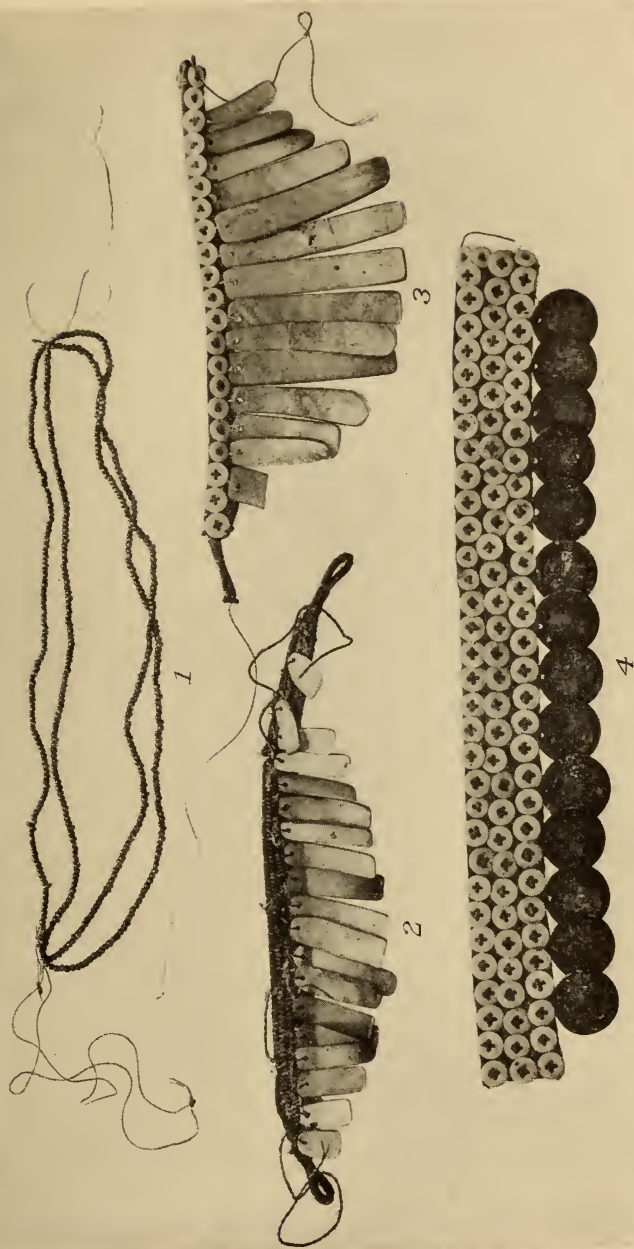
LEG PAINTINGS



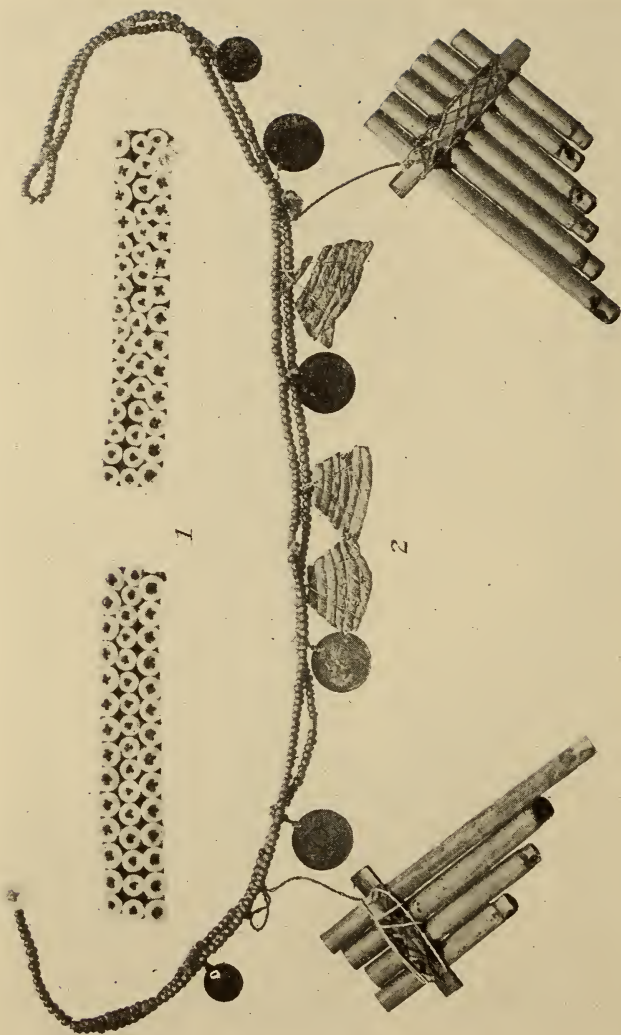
NECKLACES OF BEADS AND OF SEEDS



NECK ORNAMENT OF SEEDS



NECKLACES



WRIST AND NECK ORNAMENTS

With these pigments, especially with the black, are made a great variety of designs ranging from broad bands to very fine dots and narrow lines. As is shown in pl. XXXIX-LII, the designs employed in these face and body paintings are of almost limitless variety and combination; however, while the Cayapa have developed this phase of personal adornment to such a degree, they never recognize any special signification in the designs employed. The designs, as those on mantas, canoes, calabashes, and other decorated articles, are sometimes named, but in few cases was it found that any of them were intended to be graphic, and in no instance was any symbolic meaning attached to them: they are regarded as merely decorative and have no other special purpose. Furthermore, none of the designs is the particular property of any individual or group of individuals, hence the greatest liberty is exercised in their use; in fact, it is not uncommon to see the same person change the designs on his face or body from day to day during a fiesta, and there is no sequence or other rule governing their use. Both men and women thus decorate themselves, using a small mirror in painting the face. In large measure, of course, the designs employed have been handed down from ancient times, but now and then a person depicts upon his face or body some new device taken from an article of modern manufacture. Such a case is shown in pl. LII, 11, where a modern three-pronged iron fish-spear is shown painted on a man's leg.

FOOD AND ITS PREPARATION

The territory of the Cayapa is abundantly supplied by nature with both vegetal and animal foods, the former being the more important. In addition, various introduced vegetal foods are now raised by the natives, the most notable of which are plantains, bananas, sugar-cane, yuca, pineapples, cacao, and sweet potatoes. There are also various introduced fruits, such as guabos, caimitos, saptis, papayas, and, to a limited extent, coconuts. In addition to these, many species of wild plants and trees yield foods; especially is this true of the palms, such as chonta dura and palma real.

The jungle abounds in a great variety of mammals and birds, most of which furnish food for the Indians. The mammals mostly used are the guanta and the guatin, two large species of rodents, the peccary, the wild-hog, the deer, the jaguar, the puma, the ocelot, a small species of red squirrel, a large species of wood-rat, the sloth, the ant-eater, and the armadillo. The birds most used as food are two species of grouse, two species of wild turkey, two species of toucan, and several species of dove. The rivers abound in various kinds of fish, several of which are eaten by the Cayapa. A species of lobster is also plentiful in the streams, and there is a very small mussel-like bivalve which is consumed to a limited extent. Reptiles of all kinds are shunned, although the boa and certain other species of large serpents occur in the region. The iguana and its eggs are much prized as food, and numbers of these large lizards are taken in the season when they come down



OYSTER-SHELL KITCHEN-MIDDEN



DRYING PLATFORM

to the river to lay their eggs. The large eggs of the alligator are also much in favor, and it is said by some that alligator flesh is edible. The eggs and flesh of another and slightly different species of amphibian, called tulicio in the local Spanish, are likewise used for food. In addition to these foods there are certain insects which, either full-grown or in the larval state, are much esteemed.

Various methods are employed in the preparation of these foods. The plantain, the most important food product of the Cayapa, is prepared in a variety of ways. It is almost invariably gathered while green, and is regularly eaten in that condition, though ripe plantain is frequently used for making a kind of gruel, and occasionally it is roasted. The usual method of preparing the green plantains is by boiling, the outer covering of the fruit having first been removed. They are thus cooked for from a half to three-quarters of an hour in a pottery vessel, or nowadays more frequently in an iron or a granite-iron kettle, closely covered with a green leaf called ū'tya hakī, which is very tough and is used in many ways in the preparation of food. It is impossible to cook green plantain so that it is tender, hence the usual mode of preparing it is to beat the hard, cooked fruit with a stone muller upon a mealing stone (pl. LXII, 1, 2), mixing and kneading it meanwhile with the hand. Usually this beaten plantain, which is called bala, is eaten without seasoning, although a little salt may be added; or it may be mixed with dried meat during the pounding. The boiled green plantain is also frequently eaten without

pounding. The ripe plantain, on the other hand, is generally prepared, after boiling, by macerating with a wooden masher, *matcō'ka*, in a wooden bowl, called *batea* in Spanish. In pls. LXI, LXII these implements are shown, the masher appearing in pl. LXI, 1-5, and the *batea* in pl. LXII, 4. In this form the plantain will keep for three or four days, and is a nourishing, concentrated food. It is, however, never eaten in this form, but is diluted with water into a very thin gruel, which is drunk more as a refreshment between meals than as a regular food. The plantain mash is also carried on short trips into the mountains or along the river, and is made into gruel as needed.

Both green and ripe plantains are also roasted over coals, the ripe ones generally with the outer covering, the green ones usually without it. When thus cooked also, the green plantain is preferred to the ripe. It is ordinarily roasted until quite dry, when it is mashed on the mealing stone with the muller. The pounding in this case is not the same as in making *bala*—the plantain is merely mashed flat, without any mixing with the hand.

Still another method of preparing green plantain, but one that is not applicable to the ripe fruit, is the making of a kind of tamales. With a small shell the plantain is scraped to a mushy consistency, and, after the addition always of a little salt and sometimes of pounded meat, fish, or certain species of insects, is rolled into a long, slender cylinder, covered with the tough green leaf, *ū'tya hakī*, before referred to. This preparation is then roasted before the fire for some



PLANTAIN FIELD



HARVEST OF PLANTAINS

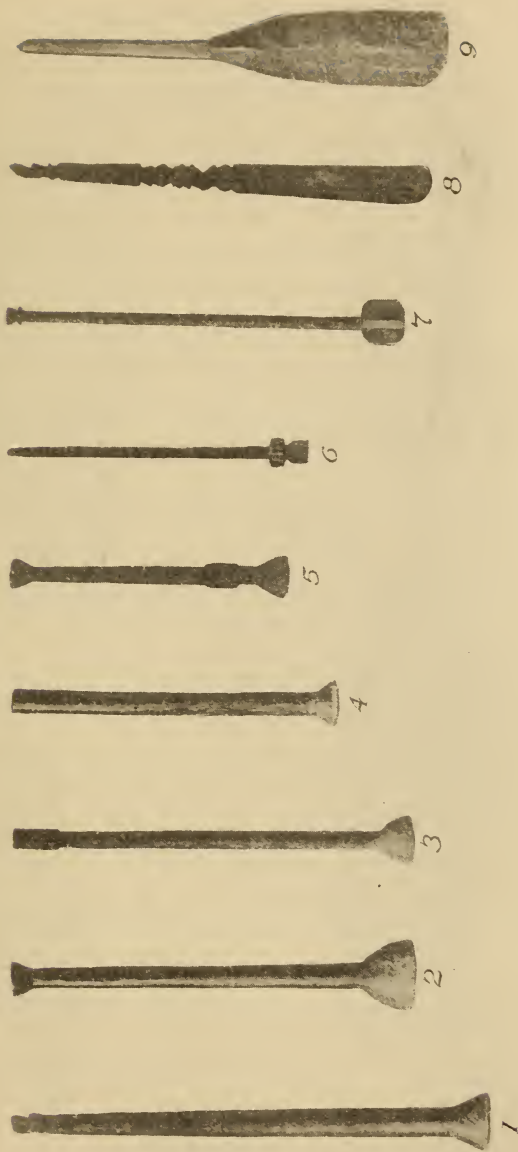
minutes, usually until the leaf covering is largely, if not entirely black. The covering is then removed and the tamale eaten in that form or after being mashed flat upon the mealing stone. When obtainable, a species of large black beetle (*Rhynchophorus palmarum*), called kũ'perũ, is used as one of the ingredients in the making of these tamales, and it is said by the Indians to be one of the most toothsome of all their foods.

The method usually employed in preparing other vegetal foods, such as yuca, sweet potatoes, etc., is by boiling in the ordinary manner. Meats and fish are generally boiled in pottery vessels without the covering of leaves above mentioned, and they may also be broiled or baked. Broiling is done in the ordinary manner, by simply placing the food over the fire. In baking, however, a special method is employed. After being properly prepared and cut into small pieces, the meat is wrapped in two thicknesses of the tough green leaf above mentioned. The flat package thus formed is then placed upon the coals, and hot ashes and coals are heaped upon it. Several minutes are usually needed for this baking, and sometimes it is necessary to replenish the coals or to turn the package over to insure proper cooking. This method is much employed in cooking all kinds of meats, fish, shellfish, and crabs and other Crustacea.

In this warm, humid climate, where meat keeps but a very short time, drying and smoking over the fire is much employed by the Cayapa when any considerable quantity of meat or fish is on hand. For this purpose

special racks are built above the fire-box, where strips of meat, or, if the animals or birds are small, the entire bodies, are placed to dry and smoke. Sometimes there are as many as three of these racks, one above another, each covering the same amount of space as the fire-box itself. Considerable time is necessary for drying meat in this way, and, when once dried, it must be kept either on the racks or near the fire in order to prevent molding. For drying fish there usually is employed the upper half of a large earthenware jar, which is turned down over the fire and the fish laid across the opening upon green sticks. Being thus close to the fire, a shorter time is sufficient to dry and smoke the fish, but when thus cured they also must be kept on the racks above or elsewhere near the fire-box in order to keep them from molding. A few vegetal products, especially medicinal herbs, are dried in a similar manner, as likewise are two vegetal foods. The inner covering of the tagua or ivory nut, which, when dried and then roasted upon the coals, has an excellent flavor, is used as food to a slight extent. Green plantain is cut crosswise into thin sections and dried thoroughly in the sun, when possible, or over the fire when necessary. It is then ground to powder and mixed with water into a thin gruel, which is used as food for babies when the mother is ill or for other reasons is unable to provide a proper supply of milk.

Boiling is employed also in the preparation of certain vegetal foods in cane juice. While practically all the product of the cane-field is used in making rum, some syrup and sweets are occasionally prepared. Yuca and



MASHERS, CHOCOLATE STIRRERS, AND FOOD PADDLES



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plantain or other fruits are cut into fairly small pieces and boiled in the cane juice during the process of reducing it to syrup, thus producing a rich and toothsome conserve. Much labor is entailed in making this delicacy, but it is rarely prepared except as a secondary product of distillation.

A rather rare food, and one much prized by the Cayapa, is a large white, brown-headed grub, called *kō'mucū*, which is found in rotten trunks and stumps of fallen palms. Their presence is easily detected by their low, crunching sound as they eat the tough palm fibers within. Such a log is cut open and the grubs are carefully taken out, along with a considerable quantity of the rotted palm-wood. They are usually placed in burden-baskets and then stored in the house in a closely-covered olla until needed. The grubs have a very tough skin, and contain a considerable quantity of rich fat, resembling lard, which is used by the Indians in several ways. The *kō'mucū* may be eaten raw, but more frequently it is broken open, placed over the fire in a small pottery vessel, and fried in its own fat, so to speak, resulting in a very rich oily food. Another favorite method of preparing this food is to mash and make into a gruel some boiled ripe plantain, which is stirred into a pot of *kō'mucū* that has been made to boil with a small quantity of water. Most of the *kō'mucū* used in making this dish are left whole, but a sufficient number of them are broken to liberate a considerable quantity of fat into the receptacle. The result of this process is a rich food of the consistency of gruel, and it is relished, perhaps, above all others.

The Cayapa make frequent journeys to the ocean, chiefly for the purpose of securing shellfish and crabs, which are abundant along the beaches about the mouth of the river. There are several species of clams and mussels, as well as oysters in large numbers. Also crabs of several species are very abundant, and are captured usually by digging out their burrows. Both the shellfish and the crabs are brought alive up the river, the crabs being confined in coarse baskets. Oysters are usually heated over coals sufficiently to cause the shells to open, and are eaten directly from the shells with a bit of salt or lemon; but clams and mussels are generally boiled. Crabs also are almost always boiled, although sometimes they are roasted.

Inland, along the banks of the Rio Cayapas and its tributaries, are obtained three other foods of the same class. In the wet soil of the jungle live large numbers of a small, bright-red land crab, called *ně'lū*, or, more specifically, *kaia'pa nēlū*. This crab has one very large arm, which is the only part used as a food. The crabs are caught in great numbers, and the large arm is removed and roasted. In the waters of these streams are also large numbers of a small species of lobster or crayfish, called *pī'cū*, which is considered an excellent food. It is caught with a special dip-net, called *cīa*, used almost exclusively for this purpose. The third food of this class is likewise obtained from the rivers. It is a very small bivalve, resembling a miniature mussel such as is found in the ocean, and is gathered at certain points along the streams where the rock walls of the banks or where bedrock affords convenient lodgment.

AGRICULTURE

As before stated, the Cayapa practise agriculture to such an extent that it may be considered their chief occupation, for by it are produced their chief food supply and also certain materials used in textiles. Under agriculture should be classed not only the introduced domesticated plants, but also certain indigenous vegetal growths which are cared for to a greater or lesser extent. These various products are in large measure raised for consumption by the Indians themselves, but some are sold in the settlements at the mouth of the river.

The regular Cayapa dwelling, as before stated, is situated near the bank of the river, and is almost always flanked, usually on both sides, by clearings and fields. Plantains, bananas, sugar-cane, cacao, cotton, yuca, rascadera, pineapples, yams, tobacco, corn, coconuts, rubber, and certain herbs are grown by the Indians. The first five of these are almost invariably found in the fields immediately adjacent to the house. Some of the other products mentioned, such as yams, corn, coconuts, and yuca, are not raised by all the Indians, and rubber is more frequently grown at some distance from the house, as it thrives better under special soil conditions. In addition to these nearby fields, frequently a favorable location for more or less extensive plantings in the hills is found along the banks of some estero and at a considerable distance from the river. By some of the Indians it is claimed that the plantain grows better at some distance from the main stream, as does also "pita," the plant which yields the tough

white fibers used in making one kind of string. In all cases, however, such fields are comparatively near some stream, thus enabling those who cultivate them to travel back and forth in canoes and to transport readily the product of the fields to their homes.

The most important vegetal product of the Cayapa fields is the plantain, the uses of which as a food have already been discussed. The plantain, like the banana, is grown from root-stocks, never from seed. After the planting of one of these root-stocks, nine to ten months of growth are required before the first racime of fruit is harvested; but while the stalk bearing this first racime is coming to maturity, several small shoots from the parent root-stock are developing, so that within a few weeks after the harvesting of the first racime a second is matured, and so on indefinitely. Thus when a field of plantain is once established, it practically never needs replanting, provided, of course, it is properly tended and cleared of the rapidly-growing brush and weeds. Each root in such a field will mature a stalk and a racime of fruit about once every four to six weeks the year round, there being practically no seasons or seasonal changes in this region. A stalk bears but a single racime, and this is so heavy that, as the young fruits make their appearance, a prop is always placed against the trunk of the plant upon the side on which the racime hangs. When the fruits are well filled, but while they are yet green, the entire stalk is chopped down with a machete. This is done for the reason that the stalk bears but a single racime and would therefore naturally die after

the ripening of the fruit, and also to facilitate harvesting the heavy racime of fruit, which is usually from ten to fifteen feet from the ground. The fruit having been removed, the trunk is chopped up and rolled away from the newly growing shoots. Owing to its succulent character and to climatic conditions, the trunk decays rapidly.

Being the chief food of the Cayapa, plantains are grown in considerable quantities, often a single family having a field covering several acres. It appears, however, to thrive better in some places than in others. For instance, in the region about Punta Venado the land is comparatively low and wet, and complaint is made that the plantain does not do well. Along the Rio Onzole, on the other hand, better conditions are said to prevail, the land being somewhat higher and having better drainage.

The fields of plantain are in large measure tended by the women, though the men frequently assist in clearing the fields. The harvesting is done almost entirely by the women, who cut down the stalks as above mentioned. They strip off a wide band of the bark from the midrib of one of the large leaves, which they use as a head-band in carrying the racimes of fruit from the field to the canoe, thence to the house. As before stated, the plantain is always gathered while green. Even if ripe plantain is desired, it is usually gathered green and allowed to ripen indoors. The gathering of the plantain while green is, first of all, a matter of necessity, since if it were left in the field to ripen it would be devoured by parrots,

rodents, and bats. Furthermore, the plantain has a much superior flavor when gathered green and ripened in a shady and fairly cool place. If allowed to ripen on the plant, the Indians claim that it is insipid.

The banana, which in some respects can hardly be distinguished from the plantain, is cultivated and harvested in precisely the same manner. Of this fruit there are three species: a large yellow, a small yellow, and a small red species; but they are almost never used as human food, being cultivated in nearly as great quantities as are plantains for the purpose of feeding the hogs, of which the Cayapa raise considerable numbers.

Sugar-cane, though introduced, has a native Cayapa name, e'lla, and is one of those products at present most grown by the Indians. Often immediately adjacent to the dwelling, and always within a short distance of it, is a cane-mill and distillery, called tapī'tcī ya or ta'pī ya, usually surrounded by comparatively large fields of cane, which thrives especially in low, wet ground. In pls. I, II, are shown cane-mills which are immediately adjacent to the houses of their owners, and to the right in each case glimpses of the adjacent cane-fields may be had. In pl. VI is shown an isolated mill, flanked by its field of young cane. This mill is situated directly across the river from the dwelling of its owner.

After the original planting, a few months only are required before the cane is sufficiently mature to be cut. There are no regular times for the harvesting of the cane, which is usually governed by the necessity for a new

supply of rum. When it is deemed best to replenish the rum supply, the whole family goes to the cane-field, and each with a machete and a hooked stick about three feet long, clears the field of all weeds and vines, and cuts as much of the matured cane as is needed. The stalks of cane are always cut close to the ground, and all the leaves are stripped off. The butt end of the stalk is then cut diagonally so as to leave a markedly beveled point, which facilitates its insertion between the rollers in grinding. This beveled cut is well illustrated at the lower end of the stalk of cane shown in pl. xv. This is a picture of Antonio Napa, or Pi'tcū apa according to his Cayapa name, chief of the Punta Venado division of the Cayapa, at work in his cane-field, and exhibits a field of cane in process of harvesting. All the cane leaves which are stripped from the stalks, together with the vines and undergrowth, are carried to the side of the field and thrown into the brush, since if they were left on the ground, the vines especially would soon take root and grow as rapidly as before. As the mill is ordinarily immediately adjacent to the field, the cane is carried to it usually upon the shoulders of the harvesters. If, however, it is situated at a distance of several hundred yards, the cane is generally carried to the bank of the river and thence transported by canoe to the mill. The stalks, cut usually into lengths of from four to six feet, are piled in a large rick in front of the rollers used for grinding. As shown in pl. LXIV, the cane may first be corded up on the ground in front of the mill, and later put on the floor in front of the rollers.

The mill proper, called *tapī'tcī*, from the Spanish *trapiche*, consists of two heavy rollers, usually about fifteen inches in diameter by thirty inches in length. These rollers, which are called by the same name as the entire mill, are set horizontally in a heavy upright frame and are usually at a height of about four feet from the floor. The upper roller is the continuation of a heavy squared shaft, from ten to fifteen feet in length, at the opposite end of which is a large wheel, called *tapī'tcī lyú'mī*, sometimes as great as sixteen feet in diameter. This wheel as a whole really consists of two wheels of equal diameter which are set at a distance, along the horizontal bar, of from two to three feet from each other. Each of the separate wheels comprising the large wheel consists of spokes in the form of cross-bars that pass through the squared shaft and at right angles to it, and of a rim made from one of the many species of large vines common to the region. The rims of these component wheels are joined by many horizontal bars which complete the wheel as a whole and which serve as hand-holds in propelling the wheel. The upper and lower rollers have in turn each a set of cogs by means of which, when the upper roller is turned by the force exerted upon the wheel, the lower one is turned correspondingly in the opposite direction, thus drawing the cane between them and crushing it. Usually several persons are required at the wheel in order to drive the rollers. One person, usually a woman or a child, feeds the cane into the rollers, and another receives the cane on the opposite side. A single stalk of cane is fed at a



UTENSILS FOR MAKING RUM



SUGAR-CANE STACKED BESIDE THE MILL

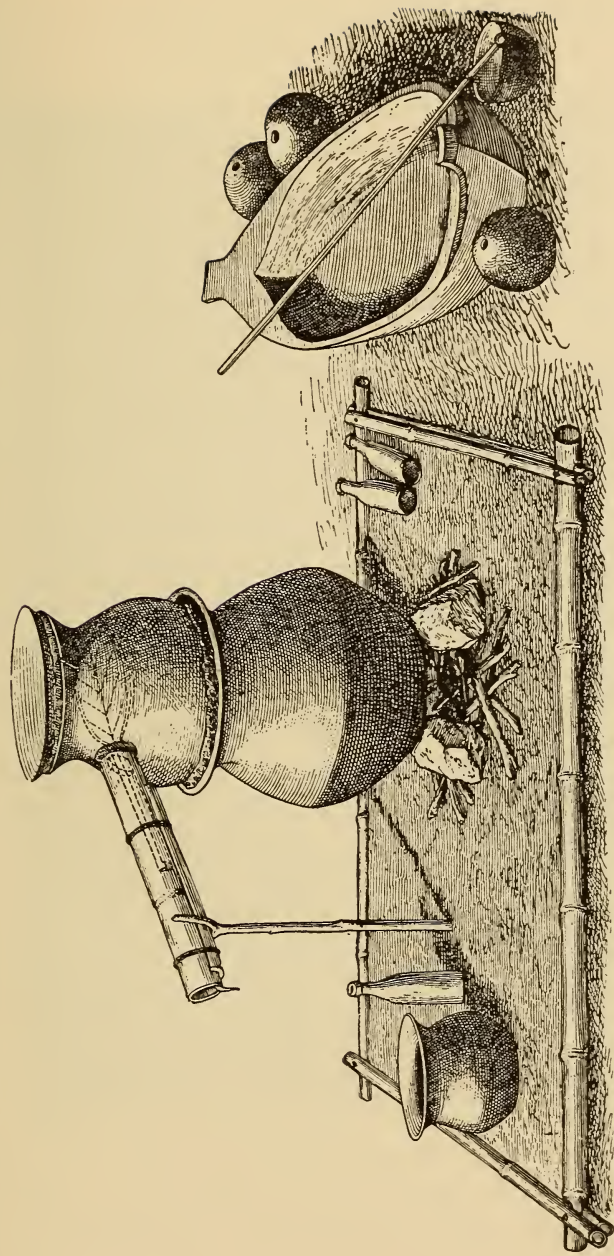
time, and each is followed immediately by the beveled point of the next stalk. Below the rollers and between the uprights which support the whole mechanism is placed a large canoe-shape wooden trough such as that shown in pl. LXIII, or in pl. LXV, into which the cane-juice flows. In case there is no such special wooden trough at hand, or the regular trough is otherwise in use, a small canoe is carefully washed out and used instead. When necessary, leaves of the *hoja blanca* or of the plantain are placed at the sides of this receptacle in order to prevent the juice from falling or splashing outside. These leaves are especially necessary when, as occasionally happens, a large pot instead of a trough or a canoe is used as a receptacle for the juice; in such an event a funnel is usually built up with leaves above the mouth of the pot.

When the whole rick of cane-stalks has been ground in this manner, the motion of the rollers is reversed, wedges are driven into spaces above the bearings of the uppermost roller in order to bring the two rollers more closely together, and the cane is rolled a second time. During this part of the process, however, two or three of the previously crushed stalks are placed one upon another and almost as much juice is pressed from each as was obtained in the first rolling. As the stalks are received from the rollers the second time, they are quite devoid of juice and are thrown out on the ground. Thus in front of each mill is heaped a large mound of cane trash, such as that shown in front of the mill in pl. VI.

During the grinding of the cane a large copper kettle,

called *pai'la*, is kept filled upon a fire in another part of the building, and the juice is here boiled as rapidly as it comes from the rollers. This boiling is allowed to continue for from ten to twenty minutes, during which time the froth which rises to the top is skimmed frequently with a special perforated dipper or skimmer, usually attached to a long handle and called *cī'cūlya*, or with a large calabash spoon called *cī'ñ-kūtcada*, the latter part of which term is from the Spanish *cuchara*, "spoon." When the juice has reached the stage where it boils without producing froth, this part of the process is considered finished; it is then dipped out of the kettle with a long-handled calabash dipper like that resting across the end of the canoe-shape wooden trough shown in pl. LXIII, and that in pl. LXV, and called *sū'mbū* or *i'ckala pī cū'nuntsūmī*, and is placed in one of the large canoe-shape wooden receptacles above mentioned, where it is allowed to cool for several hours. When thoroughly cooled it is put away to ferment in large pottery vessels, or ollas, of the form shown in pl. LXXXVII, 11. Several thicknesses of the leaf of *hoja blanca* are placed over the opening of such a pot and tightly bound about the rim. The juice is then allowed to ferment for from two to three weeks, when it is ready for distillation. The boiling and subsequent cooling of the juice before placing it in the ollas is said to be necessary to prevent souring.

Usually a sufficient quantity of the juice, called by the Spanish name *guarapo*, rendered *wa'pū* in Cayapa, is prepared at one time to fill several large ollas. While



STILL, CANOE-SHAPE DISH, AND DIPPER



PITA LEAVES FOR MAKING CORD

fresh from the rollers, as well as after boiling, in fact at any stage before it begins to ferment, the juice is called *pī' wapū*, literally "water guarapo," in contradistinction to the fermented juice, which is called *sa' wapū*, meaning "sour guarapo." The ollas referred to are especially made for the purpose, and are the most difficult work of the potter, as their size renders them not only inconvenient to form and handle while drying, but makes them also extremely hard to fire. They are almost invariably coated inside and out with *brea* (Cayapa, *amū'ya*), the wax of a small bee, which renders them impervious and prevents waste through seepage. The bases of these large vessels are comparatively small, therefore to prevent them from tipping, each is set upon a ring made of refuse cane. When sugar-cane was first introduced among the Cayapa, rum was not made, but the fermented guarapo was much drunk, and even at the present time considerable quantities are so used. To be sure, it is by no means so intoxicating as rum itself, but after it has fermented for two to three weeks it contains a considerable proportion of alcohol. The fermented guarapo is drunk not only about the home and during the process of distillation, but also to a certain extent at fiestas, to which it is brought in large ollas and consumed in place of rum and by some in preference to it.

The guarapo is finally distilled in order to produce the concentrated alcoholic beverage known by the Spanish name *aguardiente* and called by the Cayapa *i'ckala*. The still used in this final process is illustrated in pl. LXIII, from a photograph made while the distillation was in

progress, and in pl. LXV from a drawing so made as to show the wooden "worm" as well as the outside of the still. Such a still is composed of five parts. Three of these consist of (1) a large olla of the form shown in pl. LXXXVII, 7, which serves as a caldron and which is supported over the fire by three stones; (2) a second olla or vaporizer which surmounts the caldron and which is of the form shown in fig. 10 of the same plate; and (3) a flat, inverted cone of copper which rests in turn upon the vaporizer. This copper top, called *i'ckala lanō pai'la*, as also the large copper kettle used in reducing the cane juice by boiling, is obtained through trade. These appliances are manufactured chiefly by metal-workers in Quito, and both are highly valued by the Cayapa largely because of the difficulties of transportation from Quito to the Rio Cayapas. The upper olla, or vaporizer, called *kandyī-hū'lū*, is without a bottom and therefore forms a large chamber into which the vapor from the boiling guarapo in the caldron below rises and comes into contact with the inverted copper cone, which is kept constantly cool by frequently changing the water in it. The vapor condenses on the under surface of this copper vessel, runs down to the point of the cone, and drips on a flat grooved board, called *kandēlē'hō* or *kandyīhūlū ta''pa*, which forms the fourth element of the still, and which serves in a way the same function as the worm in the still used by civilized peoples. Its position and its relation to other parts of the still are well shown by the drawing in pl. LXV. This "worm" conducts the liquid out through an opening in the side of the vaporizer and

part way through a bamboo tube, called i'ckala lanō pa'kkī, the fifth element of the still, down which the liquid finally runs to a small bit of cotton at its outer opening. This cotton is brought to a point at its lower end and serves to conduct the liquid directly to a receptacle, usually a bottle, below. Quite naturally it is necessary that the entire apparatus have joints which are practically air-tight in order that the vapor shall not escape. To effect this, all the joints are filled with scraped, green plantain, which, becoming heated as the caldron begins to boil, firmly cements the parts of the still together.

This apparatus for distillation requires constant attention. The fire must be kept carefully under the caldron and must be neither too hot nor too cool. If too hot, the guarapo will boil up into the vaporizer and pass out through the tube; thus in a few seconds a bottle of rum may easily be spoiled by being mixed with a small quantity of the guarapo. Also, the water in the copper top must be changed frequently in order to keep the top itself cool enough to condense the vapor on its surface. Water is kept usually in a large canoe-shape wooden receptacle near the fire-box, as shown in pl. LXV. The long-handled calabash dipper, above mentioned, is used to remove the heated water from the copper top and to replenish it with cold. When care is exercised in the boiling and the cold water is replenished at proper intervals, the rum passes down the cotton tip into the receptacle in a small but constant stream. A caldron containing from ten to fifteen gallons of guarapo yields from four to six quarts of clear liquor and requires from

two to three hours in its distillation. This liquor is as clear as water, has a very pungent odor, a vile flavor, and contains from ten to twenty per cent of alcohol. The distillation of four or five caldrons of guarapo is considered a good day's work.

According to Cayapa belief, the success of a distillation does not depend entirely on the care with which the boiling is done. In transferring the guarapo from the storage pots to the caldron, a small pot, such as that on the fire-box shown in pl. LXV, with a capacity of a gallon to a gallon and a half, is used. With a hemispherical calabash dipper, or mate, such as that shown in fig. 13, the guarapo is first dipped from the storage pot into this smaller vessel and is then carried to the caldron. The pouring of it into the caldron, however, is a most important matter, since certain people have "much better hands" than others. That is to say, if the guarapo is poured into the caldron by a person with a "good hand," the yield of that caldron may be increased even as much as two or three quarts of rum over the yield resulting if it is poured by someone else. It is a common practice to honor a guest who happens to come during a distillation by inviting him to pour the guarapo into the caldron. Especially is this done if he has the reputation of having a "good hand." In such a case it is customary to bring the pots of guarapo to him. He receives them at the caldron and pours in the contents.

As before stated, the rum is usually caught from the spout in bottles, although it is almost immediately poured into a large storage vessel, usually a demijohn,

of from five to ten gallons capacity. To use the large demijohn as a receptacle directly at the spout would endanger a large quantity of rum, for whenever a caldron boils over it is necessary to return the mixed rum and guarapo to the next caldron to be distilled.

When the boiling of a caldron first begins, the product is much purer than later in the process. No fixed length of time can be given for the distillation of a caldron, since the strength of the rum must be determined by testing each bottle as it is filled at the spout. The whole process, therefore, is one of fractional distillation, the strongest of the rum coming off in the first bottle taken from any given caldron. When at last the rum becomes sufficiently weak, it is considered that the distillation of that particular caldron has proceeded far enough and it must then be refilled with fresh guarapo.

Before refilling the caldron, the fire is first drawn from under it. A mouthful of water is then spurted in a small stream upon the now hard and dry plantain which cements the parts of the still together, thus softening it and permitting the parts of the still to be separated. The copper top is given a thorough cleaning and is scoured with ashes until bright, and the upper pot, or vaporizer, is also cleaned if necessary. The guarapo remaining in the caldron is dipped out with a long-handled dipper, and the caldron is finally refilled with fresh guarapo. If the result of the last distillation has been very successful, it is believed that the hand of the person who poured the guarapo into the caldron still holds its "luck," and he is usually expected to fill the

caldron a second time. If, however, a contrary result has been effected, someone else will usually "try his hand." The whole process of rum-making is one in which the women do fully as much work as the men, and they also have "lucky" and "unlucky" hands in distillation.

Usually the ordinary distillation above described is considered sufficient. If, however, an exceptionally good rum is desired, as for use at certain feasts, a special process of fractionation is resorted to and the product of the ordinary distillation is redistilled. A special flavor is imparted to the rum at this time by putting into the caldron with it several of the large leaves of an aromatic herb which abounds in the region and which possesses an anise-like odor and flavor.

As previously stated, the chief use of sugar-cane is for making rum, but, as before described in speaking of foods, the Cayapa occasionally make syrup and also a kind of preserves. On the other hand, they never make sugar, as do the negroes of this region. Much raw cane is also chewed. The fibrous though tender stalk is, of course, not swallowed, but it yields a large quantity of rich, sweet juice which is highly relished. The cane is also frequently roasted in the coals; and in boiling cane-juice to make guarapo for distillation, stalks of raw cane are frequently cut up and thrown into the kettle to boil with the juice. The result of either the roasting or the boiling is a rich food with a flavor resembling that of maple, and is even more palatable than the raw cane.

Cacao (Cayapa, kaka'bō), from which chocolate is made, is extensively grown by the Cayapa, although

almost exclusively for the sale of the dried seeds. The planting of a grove of cacao requires considerable care. The seeds are planted in calabashes or boxes at the house, and the young plants are not set into the ground until they have attained a height of from four to six inches. They are carefully protected when first planted in the open ground, a joint of large bamboo being set down around each. This precaution is necessary chiefly on account of the prevalence of ants, which would soon devour the young plants if they were not thus protected. When encased in this tube of bamboo, although it is open at the top, the young plant is rarely molested. From four to five years are required to bring one of these trees into full bearing, but even with the crude Cayapa methods of horticulture, a large tree sometimes produces as much as two or three hundred pounds of dried cacao in a year.

The brown, ovate seeds, which are contained in a large red or yellow egg-shape pod, are each surrounded by a whitish or translucent fleshy covering. The pods are gathered when ripe, brought to the house, and cut open with the machete. The seeds with their fleshy coating are then placed in a large wooden tray, such as that shown in pl. LXII, 4, some water is added, and the mass is kneaded and worked thoroughly with the hands, thus removing all the fleshy covering and leaving the seeds ready for drying. As a by-product of this process, the outer covering of the seeds, when mixed with water, forms a liquid of the consistency of thin gruel and with a pleasant, slightly acid flavor. This liquid is very re-

freshing and is drunk with much relish by the Indians. The seeds themselves are spread upon mats on the drying platform of the house and are carefully watched during the next couple of weeks to prevent them from being wet by the frequent rains. After this period they are sufficiently dry to be stored away until the next trip down the river, when they are sold to traders. Cacao is one of the most important exports of Ecuador, whose territory is the source of a considerable part of the chocolate of commerce.

Although the Cayapa cultivate so much cacao, they drink it only now and then, usually at fiestas. It is prepared by first thoroughly grinding the dried cacao upon a mealing stone such as is used for grinding plantain, and then boiling. For this purpose the Cayapa make a pot of special form, such as that shown in pl. LXXXVII, 9. The boiling chocolate is stirred at intervals with an implement of special form called *tcōkōla'te tcalī*, illustrated in pl. LXI, 6-7. The result of this process is a comparatively thick, very rich and oily liquid, quite unlike the beverage prepared from the ordinary chocolate of commerce, since the chocolate prepared directly from the seeds as above described retains all the natural oil. It may be drunk in this form, but if sugar is available it is usually added.

Pineapples (Cayapa, *tcī'lya*), the only use of which is as a food, are grown to a limited extent by some of the Cayapa. The green tops of the fruits themselves are planted close together in rows, and from these the plants grow. When once established, such a plant requires

very little attention until time to gather the fruit, which in this region is of excellent flavor, especially when allowed to ripen thoroughly on the plant.

The fleshy roots of the yuca (Cayapa, *kū''tcū*) are considerably used as food. The yuca is started by means of cuttings, and requires from seven to nine months to produce the edible roots. These roots are usually boiled in the regular manner when used as an ordinary food, but, as above mentioned, they are also frequently boiled in sugar-cane syrup to make a kind of preserves. The yuca is a very nutritious food, has an excellent flavor, and by many is much preferred to either potatoes or yams. It is never baked.

Potatoes (Cayapa, *pū'lyū*) do not thrive at this low altitude, owing to the heat and humidity, although they grow well in the valleys of the higher Andes. On rare occasions they are obtained from the Indians of these interior valleys who make journeys to the coast for trading and other purposes. They have also been procured in more recent years from the traders about the mouth of the river, but the Cayapa seldom purchase commodities of this class.

Another food of a similar kind which is grown by the Cayapa to a limited extent is the red yam. It is started by cuttings in the ordinary manner. In preparing them for food, the yams are boiled, but are never roasted, as is so frequently done by aboriginal peoples.

Of this class also is the root-stalk of the rascadera (Cayapa, *tū'a*), a species of *caladium* which is grown to a limited extent by a few of the Cayapa. This is also pre-

pared exclusively by boiling. Rascadera and yuca are grown to a much greater extent by the negroes who live along the river than by the Indians.

According to their own tradition, the Cayapa, having been formerly a mountain people, in earlier times subsisted largely on maize or Indian corn (Cayapa, pī'cū), which is still one of the principal foods of practically all the Indians of the higher Andes. On moving to the lower altitudes, the Cayapa brought the maize with them, and even yet a small quantity is grown by them. The plant itself is comparatively small, and the ears are very small, rarely exceeding six or seven inches in length. When gathered for food it is almost always taken green and is prepared in one of three ways. Frequently, the husk having been removed, the ear of green corn is simply roasted over coals, when it is considered quite a delicacy, though it lacks the rich flavor of our sweet corn. The products of the other two methods of preparing it are gruels. The first stages in making both kinds are the same, and the process is as follows: The necessary number of husked ears of green corn having been procured, the women chew the kernels from the cobs, depositing them in a large wooden tray, or batea. Since the introduction of various articles of commerce some households use a large tin grater for removing the kernels from the cobs. The kernels are then placed, handful after handful as needed, upon a mealing stone (pl. LXII, 1, 2) and ground with a stone muller such as the one shown resting on the mealing stone shown in fig. 2 of the plate mentioned, a small amount of water being added from

time to time. This thick paste is then placed in a cooking-pot or kettle with the requisite amount of water and boiled, the consistency of the gruel of course depending upon the amount of water added. The thick gruel is eaten with the fingers, or frequently nowadays with a spoon, and is eaten as ordinary food. The thin gruel, which is more frequently made and which usually is sufficiently liquid to be called a beverage rather than a mush, is drunk from small hemispherical calabashes. It is flavored with a little salt, or preferably with sugar. This food is called champo (tcambō'se in Cayapa) and is used almost exclusively at feasts, where it is served in canoe-shape wooden vessels, called tcambō's kŭle, made especially for the purpose. These utensils are from two and a half to three and half feet long, their ends are made like the prow and stern of a regular canoe, and they are elaborately ornamented with the same painted designs as are used on large canoes. These little vessels may be set upon the feast table, but often they are carried about among the feasters, in which event one of the masters of ceremony takes the prow and another the stern and pass throughout the house, being careful that everyone is served. On the surface of the beverage float from two to four or five small calabash dippers, or mates, with which the champo is drunk.

A sufficient amount of maize to provide seed for the succeeding year is allowed to ripen on the stalk each season. The ears are gathered, the outer husks bent back, and tied together in bunches of a dozen or more

ears each. These bunches are then hung from the roof to prevent attacks by rodents. Whenever possible the corn is hung where the heat from the fire will keep it from molding.

The foregoing are the chief agricultural food products of the Cayapa. Excepting the maize and the potato, all were introduced since the Spanish conquest and are now systematically cultivated. In this connection should be mentioned certain palms which provide food of one kind or other, and which, while they cannot be strictly classed under the head of agriculture, since they are not planted and tended as are the other plants mentioned, are of considerable economic importance.

One of these palms is that commonly known by the Spanish name *chonta dura* and called *kanō'tcī* by the Cayapa. One variety of this produces a cluster of red fruits, another a cluster of yellow fruits. The Cayapa name for the fruit of this palm is *ka'imbī*. Both ripen in the late summer months and are much esteemed as food. By means of a long hooked bamboo pole, these clusters are torn from just below the crown of the palm, which is usually quite tall. The fruits are boiled in a cooking-pot or kettle; the tough skin is then easily peeled off, leaving the yellowish mealy meat ready to eat. In the center of this, in turn, is a very hard nut which, when cracked, yields a toothsome white meat with a flavor resembling that of ripe coconut. The mealy yellow meat is usually eaten with a little salt, but is especially good when eaten with a thick syrup made from cane juice. It is also frequently boiled in this syrup, the result being a kind of conserved fruit.

While the fruit of the chonta dura is never eaten raw, there is another palm that produces a fruit similar in form but of a grayish yellow color, which is considerably esteemed in its raw state. Neither of these species of palm is purposely planted by the Cayapa, but when found they are carefully protected, and the fruits are harvested year after year.

One other species of palm, a very tall, slender one, produces a fruit which it eaten raw. To secure this the palm is usually cut down with a machete, which is always carried by everyone going into the jungle.

One of the most important of the natural products of this part of Ecuador is the tagua, or ivory nut. These palms, called *tí'ñ tcī* or *tí'mō būlō*, are scattered throughout the jungle and are carefully conserved by the Indians, especially where a grove of them is found near a dwelling. The importance of this palm applies both to the Indians and to the negroes and whites. The ripe nuts, *timbū pū'ka*, or *ímō pōka*, are an article of commerce, and their exportation to the United States and to Europe, where they are extensively used in making buttons, is an important industry. To the Indians, however, the tagua serves at least three other uses. When its green burs approach maturity, they are gathered and taken to the house, where they are cut crosswise with a machete. These burs are covered by an outer shell, called *ha'ñda kīka*. They are very hard and can be cut only with difficulty. Each of the nuts in this stage of its development is an almost transparent gelatinous substance, called *tcapī ta'ka*, which may

either be scooped out with the fingers or sipped. The nut is not used as a regular article of food, but more as a confection, its use being much restricted by the supply and the difficulty of opening the bur.

Another food derived from the tagua is the yellow, mealy and comparatively thin covering, called pīm būkū, or ya ū'kū, which surrounds the ripe nut itself. This is peeled off and roasted over coals, if it is to be used immediately, or dried on the smoking rack above the fire if to be used later. The flavor of this roasted meat is similar to that of crisp, baked, fresh pork-rind. It is also frequently eaten raw, but in this state it has a rather unpleasant flavor, similar to that of raw acorns.

The gathering, curing, and use of the tagua leaf, which is almost exclusively employed in thatching houses, are described in the discussion of building construction.

A very good food is obtained from the palma real, called ūya'-tcī. This is a very large species and in form is perhaps the most beautiful of all the palms. Its very straight trunk, which sometimes reaches a height of seventy-five to a hundred feet, swells considerably at a point about midway of its height and resembles an entasic column surmounted by a huge umbrella-shape crown of leaves which wave gently in the breeze. In a large specimen of this species the trunk is from three to four feet in diameter at its base, swelling uniformly to a diameter perhaps one-third greater at the middle, and again decreasing toward the crown to a diameter somewhat less than that of the base. The mature leaves reach a length as great as twenty feet.

The crisp, pure white, young leaves from the center of the crown of this palm are much esteemed as a food by the Cayapa. To secure these, however, it is necessary to cut down the whole plant, which is done with a machete or preferably an ax. The large, mature leaves of the crown are cut and pried away until the inner part of the trunk is reached. These outer, old leaves of the crown are even more fibrous and resistant than the trunk itself, and as it is almost impossible to cut them away with a machete, an ax is usually necessary. Owing to their great weight, and especially to the interlacing of the hard and very strong fibers at the bases of the leaves, a couple of chisel-pointed sticks, six feet or so in length, are needed to pry away the outer leaves after the mid-ribs have once been cut through with the ax. This inner trunk and those inner leaves which have already begun to unfold are next cut away, until the very young, succulent leaves, which as yet have not commenced to unfold and which appear in the form of a solid, slender cone of pure white, are reached. This cone often measures at its base as much as ten to fifteen inches in diameter, and may be even ten or twelve feet in length. It is a solid mass of crisp white matter, finer in texture than the innermost part of a head of cabbage and with a flavor resembling that of almonds. It is ordinarily eaten raw, either with or without salt, although a very good dish is also prepared by boiling it.

The palma real yields another useful product. The tough fibers, called *niñtcū'a*, which grow along the sides of the base of the mid-rib of the mature leaf, and which,

as above mentioned, interlace with the fibers of adjoining leaves in such manner as to make it necessary to pry the leaves apart with wooden bars, are strong and pliable, and are woven into burden-bands by which heavy loads are carried. These fibers often attain a length of about four feet and are possessed of tensile strength sufficient to enable their use as strings on the wooden harp which is now made to a very limited extent by the Cayapa. This instrument was borrowed by them from the Indians of the interior, who in turn copied it from the Spanish conquerors.

Another palm, found to a limited extent along the river, is the coconut, called after the Spanish, *kō'kō-tcī*. It does not, however, thrive at any considerable distance from the ocean, consequently few palms are found even at so short a distance up the Rio Cayapas as the mouth of the Onzole. Pl. CXXXI presents a view looking up-stream at the confluence of the Rio Onzole with the Rio Cayapas, and, upon the projection of land between them, the hacienda of one of the more prosperous of the negroes of the region. Several coconut palms appear in front of the house. Coconuts grow well along the immediate coast, and there are here large groves, the nuts being shipped to nearby villages and to points even as far away as Esmeraldas. They are purchased to a certain extent by the Indians, by whom they are used in very limited quantities as food, more especially for the so-called coconut-milk which is made from the ripe nuts.

In addition to the foregoing food-producing plants,

there are various others that are valuable for other materials which they produce. One of these is cotton, called *kū'a*. The Cayapa are expert weavers and in large measure produce all their own material. Their textiles are made almost entirely of cotton, the only wool used being that obtained from the Quichua of the higher Andes, or in these days from the yarn of commerce. The yarn used by the Cayapa is always red or blue, and is employed for the sake of the colors, not for the material itself. They grow a white and also a brown cotton, the former being, according to their statements, an introduced species, the latter an indigenous one. These, together with the green and lavender dyes and the two colors of yarn, give them a total of six native colors. Cotton is usually grown from the seed, and requires little attention when once the plants have attained a fair size. Only a few plants of either the white or the brown cotton are grown by any one family, but they bloom perpetually and are sufficient to produce all the raw material needed. The cotton is allowed to mature completely, that is until the bolls have opened and the ripe cotton is nearly ready to fall. It is then gathered (being in the condition shown in pl. CVII, 11), thoroughly dried, and stored away in packages (such as that shown in fig. 12 of the same plate), and wrapped in leaves of the *hoja blanca*, until needed for spinning. To a limited extent also the cotton plant is used in making a beverage, the leaves being boiled after the manner of tea.

Tobacco is considerably used by the Cayapa, but never

to excess as among some other peoples. It is almost never grown by them, their supply coming from their negro neighbors or through trade. The Indians claim that tobacco was not known to this region in aboriginal times, but that it was introduced considerably later than the Spanish conquest. This statement is borne out by the fact that the name for tobacco is ta'kō, which is evidently an adaptation of the Spanish term tabaco. They use neither pipes nor cigarettes, but confine their smoking entirely to cigars made by themselves. They procure the half leaves of tobacco in bundles, which are stored away until a smoke is actually wanted, when each person rolls his own cigar. The habit of chewing tobacco appears to be unknown.

In addition to smoking for pleasure, tobacco is used ceremonially. When it is desired to drive out malevolent spirits from a certain spot, a medicine-man is called in, and, assisted by the ordinary people present and perhaps by another medicine-man or two, he performs a ceremony which makes the place untenable for the spirits. Each participant provides himself with a cigar and a small calabash of a decoction made from the leaves of a certain herb, and all make a systematic tour of the infested place. As they go slowly along they wet everything about them with the decoction, blowing it from the mouth in a fine spray. Interspersed with this spraying is the blowing of tobacco smoke into the air and on any objects with which they come in contact. The head medicine-man sings or whistles certain songs and waves a special banner from time to time as the party proceeds, and

these acts, combined with the spraying and smoking, gradually drive the spirits from the locality.

Another important product of this region is pita, called sa'nō, by the Cayapa, a plant resembling somewhat the yucca of the Southwestern desert region of the United States, but with leaves which sometimes reach a length of fifteen or sixteen feet. It is usually grown at some distance back from the river, and seems to thrive best in the dense shade of the jungle. When once well started it requires very little attention other than the cutting away of undergrowth and clearing of the field which is incidental to the harvesting of the leaves. These leaves yield long, very strong fibers, called sañ bu'tyū, which are twisted into two-ply strings. These are much used in net-making, in binding the selvage of textiles, for fish-lines, and for a variety of other purposes where very strong cord is required. The leaves are cut close to the ground and brought to the house in bundles such as those illustrated in pl. LXVI, where a large and a small bundle of the freshly cut, long leaves are shown leaning against the side of the house. Each leaf yields a large number of fibers, the laborious preparation of which will be discussed in speaking of string-making.

While pita is the strongest material and is considered the best from all points of view, there is another material, called in the local Spanish cosadera and in Cayapa seṅ-gī'lya, which is used especially where string or rope of large diameter and of moderate strength is desired, such as for hammocks. This material is derived from the bark of a tree and is obtained by heating in a manner

similar to that used in making the bark cloth of the region. When the fibers are beaten out and prepared for twisting into cordage, they are usually stored away in bundles, such as that shown in pl. CXIX, 2, until needed.

An important economic plant of the Cayapa country is that from which is made the bark cloth called by the local Spanish name *damajaua* and by the Cayapa name *tû'ckī*. This is beaten from the bark of an indigenous tree called *tû'ckītcī*. The tree is felled and a section of the bark the length desired, usually six to eight feet, is carefully removed, being split along one side only. The bark may then be beaten immediately upon the same log, but it is ordinarily rolled up and taken to the house where a log is kept especially for this beating, which is done with a short maul, called *tatcī wīma'so*, such as that shown in fig. 6. One side of the maul, at least, is cut diagonally with grooves and corresponding ridges. The beating must be done within a few hours after the bark



FIG. 6.—
Beater for
bark cloth

is taken from the tree, or before it dries considerably. Placing the strip of bark crosswise upon the log, it is beaten with considerable force with the grooved side of the maul, which is held at an angle of about forty-five degrees to the length of the bark. After beating one short section of the bark in this manner, it is moved across the log far enough to bring a new section into place, and in this way every part of the bark is reached.

Having beaten the entire surface with the bark in this position, it is then reversed and placed lengthwise of the log and again beaten, the maul being held at about the same angle. This beating crushes into pulp the succulent portion of the bark, but, if properly done, it does not break the long, interlacing fibers themselves. As a result of this first beating the bark is usually about one-half wider than when taken from the tree, though it is very little if any longer. It is next placed in a canoe half filled with water and allowed to soak for several hours, usually over night. It is then thoroughly wrung, thus removing a large part of the juice and the pulpy portion of the bark, after which it is returned to the log and beaten again in order to remove the remaining pulp. Again it is thoroughly washed and wrung, and is finally spread out to dry. Just before being dried it is folded in the proper manner and creased along the lines of the folds in such a way that when dry it will readily fold along these lines and make a package with a surface about ten by eighteen or twenty inches. Pl. CVI, 3, shows one of these bark cloths partly unfolded. This is a large specimen and is folded three times lengthwise and three times crosswise. The four crosswise sections formed by the three folds are here visible. The full width of the cloth is thus seen, while only one-fourth of the length is shown. Bark cloth is usually from six to eight feet in length and varies in width from about four feet to perhaps eighteen inches, according to whether it is to be used by one or more persons at a time. The surface of the specimen illustrated plainly shows the

imprint of the maul (fig. 6) with which it was beaten as numerous sets of short parallel lines, all at an angle of about forty-five degrees with the perpendicular. Bark cloth is never decorated in any way and is strictly utilitarian. It serves almost exclusively as a sleeping mat, and constitutes, together with a mosquito canopy and a thin cotton sheet used as a cover, all that is considered necessary for a bed. It is used occasionally for wrapping a dismantled loom or for some other special purpose.

The beating of the cloth must be done very carefully in order not to cut or tear apart the fibers, thus making holes in the cloth which render it practically worthless. The fibers naturally criss-cross and interlace in such a manner that when the beating is carefully done the result is a cloth which, while very thin, is at the same time very firm. If for any reason, however, a hole does appear in the cloth during the process of beating, it may be mended by simply placing over it a piece of bark of sufficient size to somewhat more than cover it and beating this in. The beating mixes the fibers of the patch with those of the main fabric in such manner as to make the patch almost as firm as the cloth itself.

At the present time some of the most characteristic utensils of the Cayapa are made from calabashes. They claim that in their former life in the mountains these utensils were of pottery and that the calabash came into use among them only after their arrival on the Rio Cayapas. It is said also that there was originally a calabash tree native to this region, but that the two

species now used, the one producing a globular fruit called wa'iyū, and the other an ellipsoidal fruit called cū'lya, were introduced here from Colombia. Every house is provided with one or more of these trees, and usually at least one of each of the two species. These large gourd-like fruits are produced in considerable numbers by such a tree and find a variety of uses. They are gathered when just ready to turn from green to ripe and are immediately hollowed out into utensils of several kinds. The details of manufacture and the uses of these utensils are treated on pages 166-173.

Another fruit, some species of which are said to be indigenous and some introduced, which is found abundantly in this region, is what is called by the local Spanish name guabo or guaba. This requires no cultivation, but the trees are carefully guarded against destruction. It is rarely if ever purposely planted, but grows from the accidental dropping of seeds. In the vicinity of almost every house there are several trees of one or more of these species. The fruits, which grow in long pods, are much esteemed and are almost invariably eaten raw. Each variety has its own special name, as follows:

<i>Cayapa</i>	<i>Spanish</i>
mactē'-pa cilyū,	guabo de macheton (machete guabo, so named on account of the shape of the pod).
ni'nga cilyū,	guabo de tacoano.
pī' cilyū,	guabo dulce (sweet guabo). The Cayapa name signifies "water guabo."
sa' cilyū,	guabo agria (sour guabo). The Cayapa name also signifies "sour guabo."
pū' cilyū,	guabo.

Of these species the one most commonly found about the houses and the most used is pū' cilyū, a wide-spreading tree reaching a height of about forty feet. A general view of this species is shown in pl. v, in which the broad, branching top of one of the trees is shown prominently against the sky toward the left of the center of the picture. The habits of growth of the other varieties are similar to this.

A species of small *Compositæ*, called lu'lyū, which somewhat resembles the marigold, is grown with considerable care, its special use being to provide decorative flowers for fiestas. The flowers are made up into long garlands which are draped about the altar of the church or are worn about the necks of those celebrating the fiesta. They are also sometimes inserted in the hair, over the ears, or about the clothing.

Upon the drying platform attached to the house there is almost always a fragment of an old canoe or some broken pots or other utensils in which are grown several of the various species of medicinal herbs, such as limoncillo, or of other plants valued for the scent of their leaves or seeds, or plants used as teas.

In addition to those already mentioned in greater detail, there are several other introduced fruits, such as the papaya, the caimito, the orange, the lemon, the lime, and the sour sap, which are grown so rarely by the Cayapa as to make them almost negligible in a consideration of the vegetal products of the people. They spring up almost always by the accidental falling of seeds in favorable soil, rather than by intentional

planting. They are, however, all eaten raw and to a limited extent by the Cayapa whenever obtainable.

HUNTING

In the Cayapa region, where game of various sorts is so abundant, hunting is a practice of considerable importance. This is now done almost entirely with old-fashioned muzzle-loading shotguns, which have supplanted blow-guns almost entirely. In aboriginal times the blow-gun was the chief weapon employed in hunting, and a few of them are still in use, especially by the boys in hunting small birds. In addition to the blow-gun the Cayapa say that they formerly had lances made entirely of the wood of certain hard palms, and that more recently they used the bow and arrow. They maintain that they originally did not know the use of the bow and arrow, but that they became acquainted with these only after coming down from the high mountains to the vicinity of their present abode, which was then occupied by another people. The bow and arrow appear to have been comparatively little used at any time by the Cayapa, but formerly the lance was much used in hunting wild hogs and one or two other species of game. In fact it is still used by some in hunting the guanta, a species of large rodent which lives in burrows.

The blow-gun, called by the Cayapa *pitcū'a*, is a slender tube varying from about six to nine feet in length, made of palm-wood wrapped with *pitigua* and the whole covered with *brea*, the black waterproof wax used especially for calking canoes. The blow-gun tapers

slightly toward its point, the opposite end being provided with a flaring mouth-piece two to three inches in diameter. It is made as follows: The innermost part consists of two pieces of palm-wood, each containing a groove, and forming, when placed together, a perfectly even-bored tube about three-eighths of an inch in diameter and with a wall half to three-quarters of an inch thick. The two halves of this tube are bound firmly together at from three to five points along its length by means of thin, narrow strips of pitigua, or with one of the stout fibers from the base of the leaf of the palma real. This binding is merely to hold the two halves of the tube together while they are being completely wrapped, which is done with strips of pitigua about one-sixteenth of an inch in thickness and one-quarter of an inch in width. It is wrapped tightly and very evenly from end to end in such manner as to completely cover the wood. This spiral wrapping of so long an object requires a great length of these narrow strips. As the end of one strip is reached, the end of the next is inserted in such a manner as to be held firmly in place and to make each strip bind the next. This pitigua wrapping is in turn covered and made waterproof by a coating of brea, or wax, as above mentioned. On some of the blowguns a hump is made in the brea at a point a short distance in front of the mouth-piece. This serves as a kind of sight by which to take aim, though obviously it is not a very accurate gauge, consequently the aiming is largely a matter of calculation by the hunter, and accuracy is acquired only by long practice. The

mouth-piece of the blow-gun is made of a more or less funnel-shape piece of wood which fits to the larger end of the gun. The implement is shot by blowing the breath suddenly, though not too forcibly, through this mouth-piece.

In this tube are shot very light palm-wood darts, called *mō'te* or *hambī tsū'ta*, a foot or so in length and not much thicker than a heavy knitting-needle. Their lightness is overcome and the darts are given force by means of a weight of clay, called *ya'tū'mīta*, placed near the point. To make them fit in the tube in such a manner as to be air-tight, and thus give the air an opportunity to exert its force upon them, a small wad of cotton, called *kūmī tē'na*, is wound about the dart

near its middle. One of these darts is shown in fig. 7, *a*. Near the point may be seen the pear-shape clay weight, and about its middle the cotton wad. Such a small shaft would be of little service even

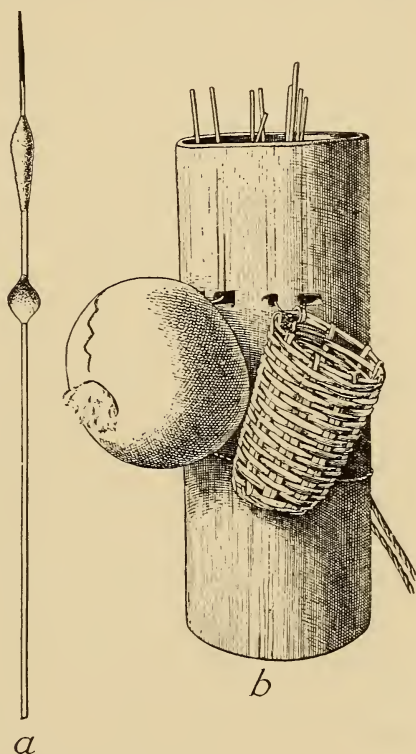


FIG. 7.—*a*, Dart of blow-gun; *b*, Quiver for blow-gun

in killing small birds if it were not for the fact that its tip is poisoned. The tip is sharply pointed and is covered for perhaps three-quarters of an inch back from its point with a vegetal poison called ha'mbī, consisting of the juice of a large tree growing in only a few places in the vicinity. This sap is gathered after the manner of rubber milk or the sande juice used in making torches. It is very viscous, and runs very slowly from a cut in the tree; in fact it is claimed that a few ounces only may be obtained from a tree in the course of a day. The juice dries within a few days, becoming solid and black or dark-brown in color. To get this into such a consistency that it may be applied to the points of the darts, a few drops of lemon or lime juice are added on one side of the receptacle in which it is kept, and a small amount of the poison worked up with this juice into a paste by means of a small paddle. The points are then dipped into this and revolved in order that they may be completely covered with it. They are then carefully laid out with a low support just back of the point so as to keep the poison from touching anything, and sufficiently low to prevent the paste from flowing back from the tip to any extent. The paste dries evenly around the point in about an hour and finally becomes very hard. When in this condition it will not rub off with ordinary friction, but immediately it comes into contact with liquid it dissolves. Thus, when a dart enters the body of a bird, a small mammal, or even a man, the poison quickly passes into the circulation. It is said to be very virulent poison and that

death ensues within a few minutes, even in men or large mammals. The palm-wood from which the darts are made is very tough and ordinarily would break with difficulty, hence one of them shot into the body of an animal, especially a man or a monkey, could be easily withdrawn. To overcome this, two slight incisions are made around the shaft, just back of the poisoned tip, about a quarter of an inch apart, so that if the shaft enters a body it is almost certain to break with the force of the blow at one or the other of these incisions. In case the dart does not break of its own accord, it is quite sure to break if an attempt is made to extract it, and in either event the poisoned tip is left in the flesh of the victim. Great care must be exercised in making and in handling these darts in order that the owner himself does not get even a small amount of the poison into his system through an abrasion of the skin or by pricking himself with one of the sharp points, for it is claimed that such an accident would almost surely prove fatal. However, without thorough experimentation with this poison it is impossible to vouch for the extreme virulence attributed to it by the Cayapa. There seems, in fact, some reason to doubt its very rapid action on the larger mammals, though in the case of small mammals and birds it is undoubtedly very effective.

A small carrying case, or quiver, called *ha'mbī pa''kī*, such as that shown in fig. 7, *b*, is made especially for blow-gun darts. It consists of a bamboo tube, about an inch longer than the darts, which is filled with soft fibers from the young leaves of a certain species of palm,

the fibers being placed vertically in the tube. This filler is called *hambī yata'pī*. The palm fibers protect the points of the darts and also prevent abrasion of the clay weights. The rear or unpoisoned ends of the darts project an inch or so above the filling, the projecting end serving as an easy means of extracting the darts as needed. In the above mentioned illustration the ends of some of the darts are shown projecting above the rim of the quiver. In actual use the ends of the darts are usually below the level of this rim and are thus afforded all possible protection. In making the drawing for this illustration it seemed desirable to show the ends of some of the darts, hence they were pulled up into view above the rim.

The usual method is to poison the points and make the incisions above mentioned directly back of the points, and then to place these incomplete darts in a mass in the center of the quiver. Attached to the quiver is a small receptacle, called *tō'kūbī*, usually a little wickerwork basket, in which clay is carried. Also there is attached to the quiver a small calabash or other receptacle for cotton, called *hambī kō-a'īū*. These appurtenances enable the hunter to put the clay weight and the wad on the darts as fast as needed. This is necessary, since if they were prepared in any considerable numbers and not used, the clay and the cotton would be of no service later. Usually three or four darts at a time are weighted and wadded ready for use and then carefully placed, each one by itself, near the outer margin of the palm-fiber filler. The quiver is suspended upon the hunter's back by

means of a string, called ya''tcua, which passes about the neck.

The blow-gun is carried over the shoulder or in the hand, but always with the point forward, since if it were reversed there would be danger of the mouth-piece being broken in passing through the jungle. When not in use the blow-gun is carefully kept in such position that no uneven strain comes upon any part of it, causing it to bend and thus to spoil its efficiency. It is frequently placed in the thatch under the eaves or in the loft of the house, but often it is suspended vertically by means of a string.

The blow-gun is an excellent and effective weapon for hunting all sorts of mammals and birds which live in trees or otherwise above the ground level, but for those which live always upon the ground and for birds on the wing this instrument is of little use, since it is not feasible to shoot horizontally or, in fact, at any considerable angle to the perpendicular, owing to the deflection due to gravity. Especially is this the case if the object shot at is small. The best results are obtained by getting almost directly under the object to be shot at and by this means practically overcoming the influence of gravity. Thus the blow-gun is especially used in shooting those mammals and birds, such as monkeys, squirrels, guatins, parrots, toucans, and a variety of other species, which are almost always to be found in trees.

The Cayapa were at all times inclined to be peaceable, but wars were sometimes forced upon the most peace-

loving. It is said that on those rare occasions when the Cayapa engaged in hostilities, the blow-gun was used as a weapon, though the lance, called tsū'ta, seems to have been preferred. This weapon, six or seven feet in length, is made entirely of palm-wood, with a simple, very sharp point. A rude lance is used even at the present time in hunting certain mammals, especially the guanta (Cayapa wala'mbū), a large rodent which lives in a burrow. Armed with a lance, the hunter sits near the entrance to one of these burrows until the guanta comes out to feed, when he is able to spear it. On rare occasions also the lance is still used in hunting the wild hog and the peccary, which are both still fairly abundant in the jungle.

The bow and arrow, the use of which is claimed to have been derived by the Cayapa from their old enemies, the former inhabitants of the Rio Cayapas, is not very clearly remembered by them, for the reason that it has not been in use for many years. The arrows are said to have been about a yard in length with shafts made from a species of wild cane, called by the Spanish name caña brava and by the Cayapa nya'nyī. The points were made of hard palm-wood. The bow and arrow appear, however, to have been comparatively little used by them at any time, and almost never as an implement for hunting. No names other than the Spanish terms for these two weapons could be learned.

No nets or snares are used by the Cayapa in the capture of mammals or birds, and only one form of trap is employed. This is the small deadfall shown in

fig. 8, used for catching small mammals, such as wood-rats, which abound in almost all parts of the jungle, and especially in places which have been recently cleared or about the edges of an old clearing. In large measure the boys build and tend these deadfalls, one or two boys sometimes having as many as half a dozen of them. They are constructed as follows: Two rows of upright sticks of almost any material are set just far enough

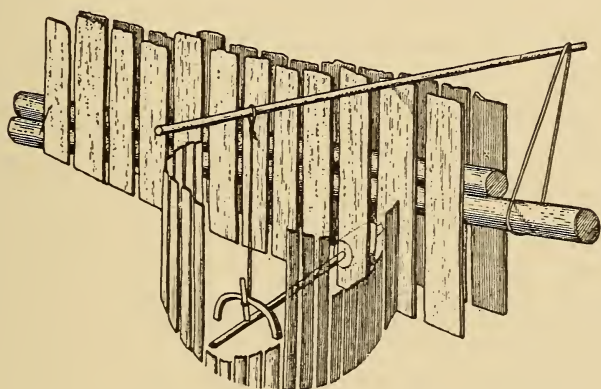


FIG. 8.—Deadfall trap for small mammals

apart to permit the free rise and fall of a log or a heavy section of the stem of a plantain or banana palm. These two rows of sticks form what may be termed the fences of the trap. To one end of this log, which is usually from four to six feet in length, is attached a cord or a piece of pitigua, which in turn is fastened to one end of the stick used as a lever. One of the upright sticks in one of the fences above mentioned is so notched as to receive this lever, which passes diagonally across it and out so that its other end is opposite a point about one-

third of the way down the log and perhaps a foot to one side of the fence. Another string or piece of pitigua is attached to this outer end of the lever and passed down to a small trigger by which the trap is sprung. The drawing for the illustration here given was so made as to show the manner in which the trigger and the bait-arm are set. This was done by cutting away in the drawing a part of the semicircular fence erected at the side of the trap to protect the trigger apparatus from being set off by some animal prowling about outside. A twig is set into the ground in a semicircular arch directly below the lever arm above mentioned. Through this arch passes the outer end of the bait-arm, the inner end of which extends through the fence which runs along the side of the log. This inner end bears, directly under the log, a piece of plantain or other bait. To hold this bait in its proper position, which is an inch or two from the ground, the outer end of the bait-arm is stuck into the ground very lightly. Its position must be firm enough to hold it sufficiently so that the pressure of the trigger upon it will not force it out of place and spring the trap; but it must not be too firm, lest the nibbling of the game at the bait will not move it sufficiently to release the trigger. The trigger is set vertically under the arch, and with its lower end resting upon this bait-arm, as is shown in the illustration, in such a manner that a very slight movement of the latter will release the trigger, which, operating through the lever, allows the log of the deadfall to drop upon the game. Often two or three rats are caught at one time with this device, which is

made more effective, in case the single log above mentioned is not sufficiently heavy, by superimposing upon it another which not only adds weight and enables the trap to kill larger animals, but accelerates its action and diminishes the possibility of the game escaping after the trap is sprung but before the log can fall. Such a second log is usually a foot or so shorter than the other.

FISHING

The numerous streams of the Cayapa region are well stocked with various kinds of fish, many of which are used as food by the Indians. They are at present caught by six different methods. There are three types of nets, the "re," or large set-net, the atarraya or conical casting-net, and the small dip-net, used incidentally in connection with the set-net. These are all used to a considerable extent, especially the set-net; but the "corral," or impounding trap, the pole and line, and the "gig," or fish-spear, are much more generally used. Of these six devices, four only, the set-net, the dip-net, the corral, and the gig, appear to be of aboriginal origin.

The re, called in Cayapa wa'kū, is, like the other two nets used by the Cayapa, made of pita fiber string and is used especially in catching a very excellent species of shad (Spanish, sabalo), called by the Cayapa awī'li. For this purpose it is made with a mesh of about three inches, and varies in length from about twenty to sixty feet according to the width of the particular estero in which it is to be used. Usually near a house there are one or more esteros where shad are fairly abundant,

but they cannot be taken at all times. When the river is in flood, the shad go in large numbers up the estero in search of certain vegetal foods which are made available by the rise of the water, and it is customary to set a net across the mouth of an estero at about the time the flood commences to recede. As the water level lowers, the fish endeavor to return to the main stream, but are impounded near the mouth of the estero by the net, which is securely fastened at both ends and is weighted down with stone sinkers called *cō'pōka* or *cū'pūka* (literally stone), along the bottom, these being wrapped in the tough leaf called *ū'tya haki* to prevent them from wearing the cords by which they are tied to the edge of the net. These sinkers are usually water-washed pebbles ellipsoidal in form and weighing not more than a few ounces each. The sinkers are trampled into the mud in order that no openings are left through which the fish may escape into the main stream. The upper edge of the net is kept up to the surface of the water by means of floats, called *walū de''pōka*, consisting of variously shaped blocks of *balsa*, a species of very light wood, and is supported also by one or more vertical poles stuck securely into the mud at the bottom of the estero and to which the upper edge of the net is tied. This last precaution is necessary because with the recession of the water there comes a considerable amount of small drift-wood and leaves which would gather about the floats of the net and finally sink its upper edge, at least in places, thus allowing the fish to escape.

When the water has sufficiently subsided so that the

fish have nearly all returned to the mouth of the estero, the owner of the net, accompanied by all available members of his family and by any friends present, goes to the estero with a second net of the same kind. This net is carried up-stream to a point where the water is very shallow; it is then placed across the stream and moved carefully down as a seine, the fish being driven before it. In this way the fish are at last impounded between the two nets in a space from twenty to twenty-five feet long and of the width of the estero. Ordinarily, in bringing the net down to this point, a considerable number of fish are caught by hand, for while two or three persons attend particularly to the moving of the net, others are diving in the water ahead of it and catching by hand any fish which may have sought refuge in hollow logs or in crevices in the banks. Also many are caught as they strike the seine in an attempt to run back up-stream. Such a fish will usually push several times in succession at about the same point in the net, thus giving to one of the fishermen ample indication of its whereabouts. As each fish is brought up by a diver or is caught by one of those tending the seine, the top of its head or the back of its neck is bitten, thus stunning it, and it is either thrown into a canoe kept at hand for the purpose, or cast upon the bank. When the nets are finally brought close together so that the remaining fish are impounded in the small space above mentioned, conical dip-nets are used by the divers to catch them. As the dip-nets are brought up, they are passed to a man in the canoe, who empties them of the

fish and kills with a club the larger ones which might flop over the gunwale. Finally, all the fish possible having been taken in this manner, the set-net and the seine are taken up and brought back to the house. Both are carefully washed and cleaned at the river after having the stone sinkers removed, and are then hung up on a long bamboo pole, especially provided for this purpose, over the drying platform at the side of the house. When thoroughly dried these nets are each carefully folded and then compactly twisted, in such fashion as is shown in pl. cxx, 2. The stone sinkers are unwrapped and stored away in a basket until again needed. The floats used on the net here shown measure about four by eight inches by three-quarters of an inch. In many other cases the floats are of various other forms. They are quite often cylindrical.

Nets called *atcī wa'kū*, of the same kind but with smaller meshes, are made for catching certain other species of fish. In general, however, the use of the seine is confined largely to catching shad, as above described.

The *atarraya*, which name is corrupted by the Cayapa into *ata'ia*, is a large conical casting net heavily weighted about its mouth with lead or, when this is not available, with stone sinkers. In pl. cxx, 1, is shown one of these nets weighted with lead sinkers weighing in the aggregate about twenty-five pounds. In this illustration it is shown folded at about its middle, while the upper end or apex of the cone is wrapped around the remainder of the net. To the point of the cone is attached a long, heavy cord, the end of which is held in the hand when

the net is thrown. To cast this net well requires much practice. It is always done by a man standing in the prow of a canoe propelled by a paddler at the stern. He watches the water and throws the net at any point where the fish appear to be moving or jumping. In making such a cast, the line and the upper part of the net are coiled in the left hand, while one edge of the sinker-lined opening is caught between the teeth. The greater part of the weight of the sinkers is swung by the right hand until a sufficient motion has been secured to give force to the cast. Then the coiled net and cord are liberated by the left hand at the same moment that the right hand throws the heavy weight of sinkers. The edge of the weighted opening is held between the teeth an instant after the cast is made, thus causing the net to open in a wide circle as it descends through the air. The heavy weights sink the entire net very rapidly in the water, thus imprisoning any fish which are within the circumference described by the sinkers and the edge of the net. The net is allowed to sink to the bottom and is then pulled in: this must be done very carefully and in such manner as not to raise the sinkers from the bottom of the stream too suddenly. They must be dragged along until they have all come together in one point, and the fish, if any have been imprisoned, have been driven into the upper part of the net. The net is then carefully pulled up beside the canoe, the sinkers meanwhile holding the opening sufficiently well closed to prevent the escape of the catch. By simply pulling on one side of the net, the

fish are allowed to fall into the bottom of the canoe or into a basket, and the net is then ready for a second cast. This net serves only for taking small fish, and is not very much used by the Cayapa. Apparently their knowledge concerning this form of net was acquired from the negroes. At any rate their knowledge of its use is comparatively recent.

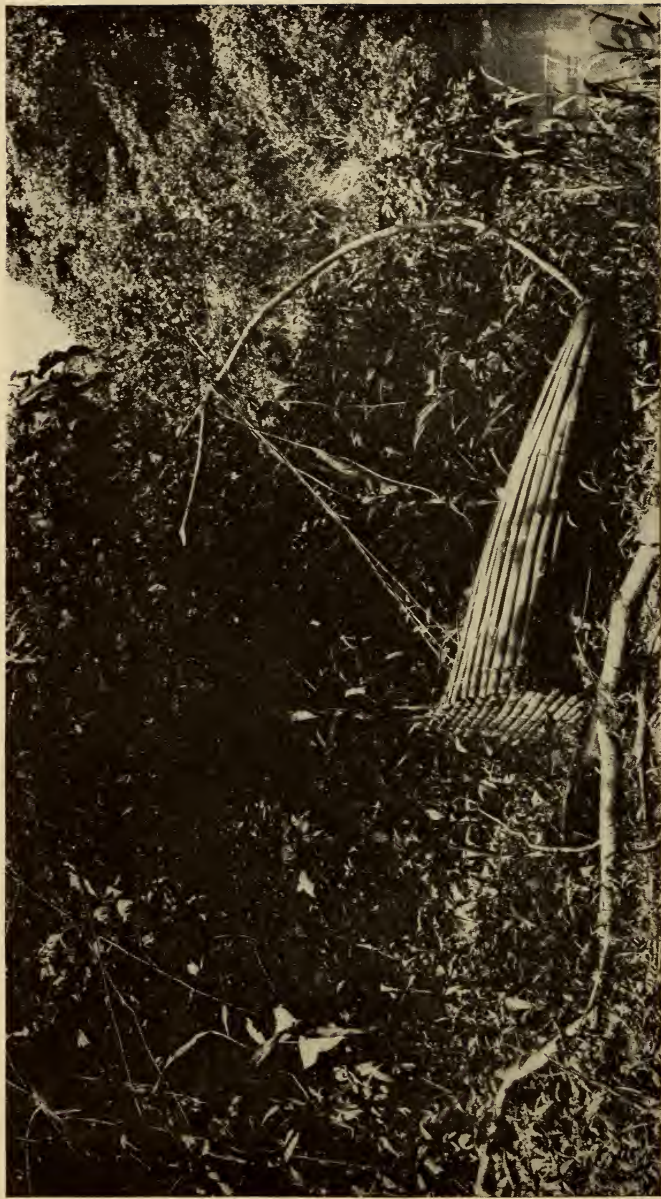
The dip-net, called by the Cayapa *cī'a*, above referred to, is a small-meshed conical net and is used not only for fishing, as above described, but especially is it employed for catching the small lobster, or crayfish, called by the Cayapa *pī'cū* or *a'bīcū*, which is so abundant along the banks of the river and especially along the banks of the esteros tributary to the river. The opening of this dip-net is held in shape by a hoop made of a pliable vine simply bent around and its two ends tied firmly together. Thus one end of the hoop is rounding, and the opposite end, the one used as a handle, is fairly sharp-pointed. The dimensions of this opening are perhaps fifteen to twenty inches by thirty to thirty-six inches, and the distance from the rim to the point of the cone of the net itself is from twenty-four to thirty inches.

All nets are made from pita-fiber string, the details of the making of which, as also of net-weaving, are treated in the discussion of cordage and netting.

A corral, or impounding trap, such as that shown in pl. LXVII, is used by almost everyone living along the tidewater portion of this river system; and, owing to the level character of this coastal plain, the tidal rise



IMPOUNDING TRAP FOR SHAD



NEAR VIEW OF SPRING TRAP

and fall are felt many miles from the river mouth. The success of this form of trap depends particularly on the peculiar habits of the shad. As above stated, this fish subsists entirely on vegetal foods, which it hunts along the river banks at high tide and usually at night, keeping at other times in the deeper midstream waters. At times of flood, as mentioned in speaking of the use of the set-net, the shad abandon the main stream and visit the esteros. Obviously, therefore, the corral is a device suited especially to those parts of the river where the water level rises and falls with the ocean tide, and obviously also it is of no service when the river is in flood.

A point properly protected from strong currents at times of flood, and otherwise suitably situated along the river-bank, is selected, and a pole, to which some plantains or other vegetal foods are attached, is placed in the water near the bank in order to give assurance that the point selected is one specially frequented by shad. The shad come almost exclusively at night, and if it is found that the bait has been taken on several successive nights, it is selected as the site for a corral. Care must be used in selecting such a site, for if it be chosen along a part of the river-bank where the current is rapid, the corral is likely to be carried away during a freshet. A desirable site having been found, two sides are built by setting firmly in the mud bamboo or palm-wood sticks, these being bound firmly together by means of cross-bars running horizontally and braced by others extending diagonally. These two sides proper are

usually much wider than the third side, or that which faces the river, and which may be termed the end of the corral. The opposite sides are not parallel, but converge as they leave the bank. The fourth side of the trap is formed by the river-bank. The three sides which project into the water are of sufficient height that they emerge from four to six feet above the surface at high tide. The front side or end of the corral is often very little wider than the gate situated at its bottom. This opening varies in size according to the dimensions of the corral, but it is always at least three feet wide and equally high. Two smooth, straight poles are placed vertically just inside this front wall, and upon these the gate, which is usually made of palm-wood poles bound by pitigua to cross-bars, slides up and down. The gate is always weighted with heavy stones, which cause it to drop quickly, and it is held up and open by a pitigua cord that passes over a rounded transverse bar overhead and then back to a blind on the bank from which the trap is sprung. At a point just outside the gate there is usually placed a vertical pole to which is attached a small amount of bait which serves to entice the fish to the gate itself, through which they later enter the trap where they espy more bait fastened to two or more vertical poles at some distance in from the gate. These poles, being quite slender, shake easily as the fish nibble at the bait, and it is the motion of the upper end of the pole that gives warning of the presence of the fish to the watcher on the bank. The corral is usually watched only at comparatively high tide, for

it is then that the shad travel near the bank in search of food. Furthermore, the opening of the trap is ordinarily somewhat above water at low tide, as is shown in the illustration above mentioned, the photograph for which was taken at very low tide and when the whole corral was entirely above the water line. The greatest of care must be exercised in watching one of these corrals, since the fish are easily alarmed and any noise or unusual movement about the corral is likely to frighten them away. Frequently, in order to render the surroundings more realistic and natural, some palm-leaves or some branches of trees are placed in or along the bank about a corral. The trap being sprung, the fish are impounded until the tide ebbs, when they are left in very shallow water, or even in the mud itself, and may be easily taken from the corral. The catch in one of these corrals is, of course, very uncertain, but frequently several fish are taken at one time, and while shad are especially sought, various other fish are impounded as well.

Fish-spears or gigs are of two kinds. That at present in use for large fish is of the ordinary trident form, called *a'sta* in Cayapa, and is strictly an introduction of civilization. Its head nowadays is made by blacksmiths at the coast. The pole on which this head fits is from ten to fifteen feet in length. One end of the pole is split and the flat tang of the spearhead is inserted, the joint being securely wrapped with pita string, which is water-proofed and protected by means of beeswax. As an additional precaution against loss,

several stout strands of pita cord are fastened securely to the head at the point where the prongs branch off from the tang, and these are attached to the pole at a point a few inches up from the head. Thus in case the head should pull out of its socket it is still securely fastened to the pole and cannot be lost.

The other form of fish-spear, called in Cayapa *pūtyū'lya*, is made usually with a long, slender, palm-wood pole not more than half an inch in diameter, the prongs being made from heavy fish-hooks which have been straightened out. The point of the pole is fairly flat and about an inch in width. From two to four straightened fish-hooks are bound to this flat point by means of pita cord, which is then thoroughly covered with brea to make it impervious. This form of gig is suitable only for catching very small fish. While the gigs of the present time are thus made of iron, the aboriginal spears were similarly shaped but were provided with points of hard palm-wood.

Another gig, made in the same manner as the last, but usually with a heavier pole and heavier points, is used for spearing water-turtles, which are fairly abundant here. This gig is called *pūtyū'lya*, as well as *hwe'ska* or *fe'ska*, and the only marked difference between it and the fish-gig just described is that its points have no barbs. It is said by the Indians that it is impossible to pierce the shell of a turtle with a barbed gig, but that the barbless point passes through the shell easily. The terrapins, or land turtles, having harder shells, are always caught by hand.

At the present time the hook-and-line is very much used in fishing, though this was introduced by the whites. Strong, slender, fish-poles, called *wañgū-tca'li*, seven to ten feet in length, are made from the upper branches of the large bamboo. They are gathered when thoroughly matured but while still green, and are hardened and straightened

by heating. The lines, called *wañgū-tcū'a*, or *sañ-dō'a*, are made of native pita string and are usually quite fine. The strength of the pita fibers makes it possible to use a very fine line for comparatively large fish. Such a fish-line, provided with a special pottery sinker and an ordinary steel fish-hook, is shown in fig. 9; it is wound in this case on a cylindrical piece of balsa. This line is called *tcūndyē'pū* and is used in the hand after the fashion

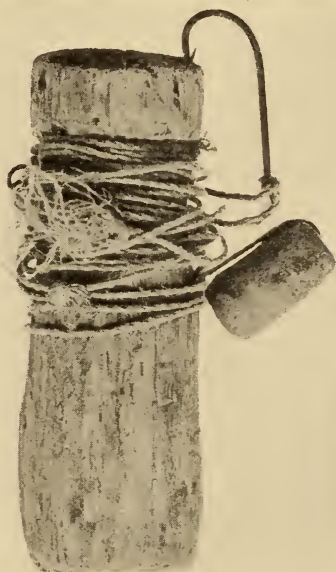


FIG. 9.—Fish-line with pottery sinker

of a troll. In case it should be dropped or pulled overboard, it is saved by means of the balsa float. Ordinarily all lines are provided with lead sinkers, but the pottery cylinder especially made as a sinker is an old type and was formerly very much used. Hooks, called *weñgō'la*, are now obtained from traders at the coast, although it is

said that when this method of fishing was first introduced through contact with the early Spaniards, crude hooks were fashioned by hammering out pieces of iron.

At the present time this method of hook-and-line fishing is so much in vogue that almost every man has his special little canoe and a special short paddle which are used almost exclusively for fishing. It is customary to paddle for some distance against the tide or current and then to fish back down with the current along the bank. In this way little effort is required in paddling, and a sculling motion of the paddle with the left hand is sufficient to keep the canoe in its desired course. With a pole and line go a small, hemispherical, calabash dish of angle-worms, a small bottle-shape basket (pl. XCIII, 3) of grasshoppers, or a calabash of a certain small reddish fruit, all of which are used as bait, each according to the kind of fish sought.

On rare occasions the trot-line, called weñgūtċū'a (?), such as that shown in pl. CXIX, 1, is used. The main line, called señgi'ri, is made usually of the coarser string fiber called by the Spanish term *cosadera*, while the small "leaders," called simply sañdō'a, to which each separate hook is attached, are made of pita string.

WAR

The Cayapa maintain that in ancient times they rarely went to war, and then only on the greatest provocation, as, for instance, when they were harrassed by the former inhabitants of their present domain until forbearance was no longer possible and they descended from their

old mountain home at Pueblo Viejo and wiped their enemies out of existence.

In the only instance of war which the Cayapa describe fully, it appears that they organized themselves into war-parties and systematically invaded the enemy's territory. Predatory raiding was never practised by them, perhaps on account of their isolated position as well as by reason of their non-militant character.

The lance was the chief weapon used in war, though the bow and arrow seem to have been used to a slight extent in more recent times. The blow-gun with its poisoned dart was also used in war to some extent. It is claimed that the pre-Cayapa inhabitants of this region used throwing-stones with good effect. The sling, however, appears to have been unknown, the stones being simply thrown with the hand.

MANUFACTURES

CANOE-MAKING AND CANOEING

The rivers of the Cayapa region provide practically the only means of travel until the limit of navigation by canoe is reached. In fact, the streams provide almost the only means of travel at all, owing to the density of the jungle and to the fact that practically all of the Cayapa live along the rivers below the limit of navigation. The few trails through the higher mountains are almost never used except when journeys to the interior are made. On the other hand, there are various short trails extending back into the hills

along these rivers—these are used for hunting or for short trips from the rivers. All the permanent habitations are situated along the banks of the rivers, and to pass from one to another of these, as well as for making trips of greater length, the dug-out canoe, called *kū'le*, is used. In fact, the canoe is one of the most prominent features of Cayapa life. Everyone begins in early childhood the training which makes him an expert canoeman, and is perfectly at home in a dug-out, whether it be along the smooth sluggish waters of the lower course of the river, in the rapids of the upper course, or out on the ocean coasting to some nearby point.

From the important place the canoe holds in the life of the people, it is natural that much care should be given to its construction and that the art of canoe-making should have reached a high state of perfection. Of the many species of trees in the jungle, only a few produce woods which are hard and tough enough to be suitable for canoe-making. These qualities are found in certain species which have what may be called a criss-cross grain, that is, an interlacing of the wood fibers which makes splitting almost impossible. Though a considerable degree of hardness is required, too great hardness is not desirable. Certain woods, therefore, such as the *guayacan*, are too hard and heavy to be suitable.

Having found a tree of the desired kind, it is felled with an ax and the canoe is roughly fashioned from a portion of its trunk, as is shown in pl. LXX, and finally this section is cut loose from the remainder of the tree.



CANOE-MAKING



CANOE-MAKING

It is then roughly hollowed out with the ax, the sides and bottom being left considerably thicker than is desired in the finished canoe. Frequently it is necessary to do this part of the work at a considerable distance from the river, and even at a considerable elevation above one of the small creeks or esteros tributary to the river. Such was the case with the large canoe shown in pls. LXX, LXXI, which was made at a distance of nearly three miles from the river and two and a half miles from the navigable waters of the nearest estero. Furthermore, the tree from which the canoe was fashioned grew near the top of a ridge about three hundred and fifty feet above the floor of the narrow valley of the estero, and the sides of this ridge were so steep that it was necessary to snub the canoe down to the estero by means of a couple of stout cables. Having worked out such a canoe to approximately its final form, it is turned up on one side and bound to one or two vertical stakes, as shown in pl. LXX. At the same time it is raised a few inches off the ground by means of blocks in order to prevent rotting. It is then allowed to dry and cure in the shade for several weeks.

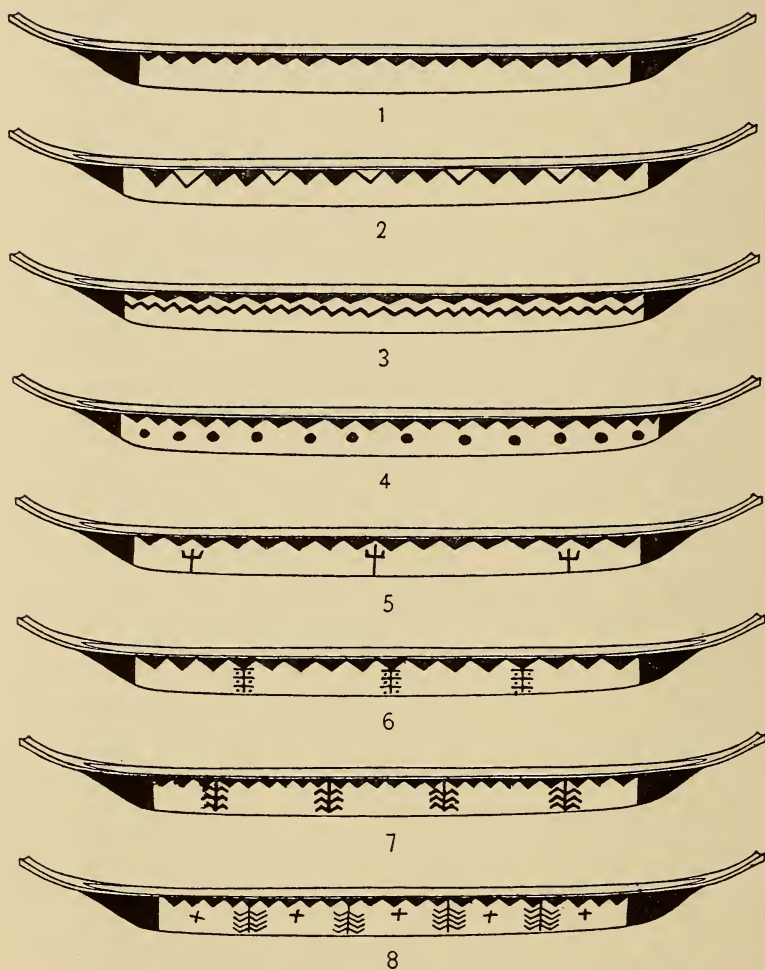
Finally the owner invites a number of friends to join in hauling the canoe to a point where it may be floated. This task may be a comparatively simple one if the canoe is practically on a level with the river, but if it is at a considerable elevation, much care is needed. Also, the size of the canoe is an important factor. A small canoe may be hauled by one or two persons; but a large one, say one twenty-five or thirty feet in

length, requires the labor of ten or a dozen persons. In the case of the large canoe shown in the illustrations three pairs of small holes were cut into its gunwales—one pair near each end and one at the middle—and to these were fastened three green wooden bars about an inch in diameter and projecting six or eight inches on each side of the canoe, thus serving as grips or handles for the haulers. The process of cutting the holes for these cross-bars is shown in pl. LXXI. Such bars must not be bound tightly to the gunwales, but of such looseness that they may be slipped in and out of the lashings, as is often necessary in passing close to a tree. A trail is carefully cut through the jungle, the trunks of small trees being thrown across it at intervals of a foot to four or five feet, in order to keep the canoe above the ground, thus greatly reducing the friction as the craft is moved along.

If the site of the construction of the canoe is at a considerable elevation, it must be let down carefully to the lower level by way of an incline. To accomplish this there are first wedged in at the prow and stern of the canoe two short transverse bars just below the level of the gunwales. From a large tough vine or aerial root, said to come from a plant called in the local Spanish *matamba*, and in Cayapa *bī'ta*, are twisted two-ply cables, such as that shown in pl. XCI, 5, and often as much as sixty or seventy feet in length. One of these is tied with a simple knot to each of the transverse bars above mentioned. The forward cable is passed with a half-hitch about the prow of the canoe and is



PLACING OF CROSS-BARS FOR TRANSPORTING THE CANOE



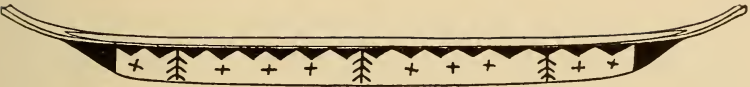
DECORATIVE PATTERNS PAINTED ON CANOES

bound securely at the point at which the cable crosses itself in making the half-hitch in order to prevent this from slipping off the prow. The one at the stern passes directly over the notch which is always present at each end of the canoe, and is bound to the point of the stern in such manner as to prevent slipping to either side, thus keeping the stress of the cable directly upon the short cross-bar and avoiding the danger of wrenching the bar loose by a sidewise pull. By snubbing with these cables, a large canoe may be lowered with comparative ease down a very steep incline. To accomplish this, a single turn is taken with the rear cable about the trunk of a tree, and by slacking off the canoe is let slowly down until the end of the cable is nearly reached. Meanwhile the forward cable has been passed about a tree and snubbed in the same manner to prevent accident to the rear cable. Having finally neared the end of the rear cable, the forward cable is made fast and the canoe held in position while the rear cable is taken down-hill and passed about a tree near the canoe in the same manner as above described. Then the two cables are paid out again until the end of the forward cable is reached, when the canoe is again halted and the forward cable taken down the hill as was the rear one. Thus, by this process of snubbing with the two cables, the probability of losing control of the heavy craft is eliminated. All this time, of course, the haulers are at the sides of the canoe helping to steady and guide it. One person only is needed to pay out each of the cables. Care is taken in snubbing a canoe down in this manner to see that

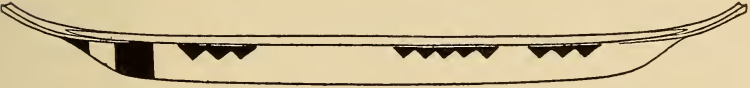
it does not slide from its course and strike a tree. Finally, when the bottom of the incline is nearly reached, both cables are released and the canoe is allowed to take its course over the remaining short distance to the floor of the valley, its momentum usually carrying it for some yards out on the plain.

Having reached the level of the estero or river, the hauling is now done entirely by hand until the canoe is finally launched. If launched in a small creek, it is often necessary still to haul it by hand for a distance down the creek, since it must be passed over sand-bars and even lifted over large logs, but small ones are always cut away. At last a point is reached where there is sufficient water to float the canoe down to the river. Sometimes, however, it is deemed advisable to haul the canoe only as far as a point on the estero known to be reached by floods; it is then tied to a tree until such time as the back-water of the river extends far enough to allow the canoe to be paddled down to the main stream.

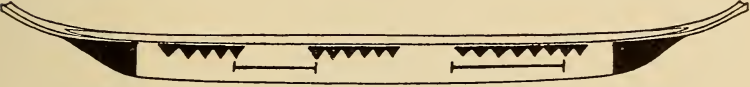
In either case the canoe is finally taken to the house. If it is small, it may be taken into the house, but if a large one, it is more frequently placed under the house or in a nearby grove of palms or trees. It must then be worked and smoothed by means of adz and planes until reduced to the required thickness, and the desired form and finish are obtained, when it is placed in a dry, shady place to season thoroughly before being calked and painted with brea. In adzing the canoe it is placed in a normal upright position and the inner surface



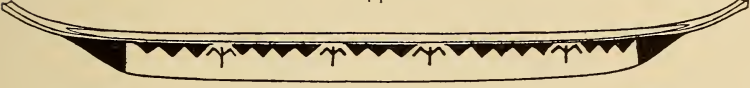
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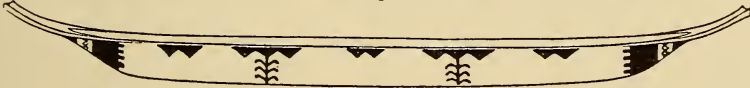
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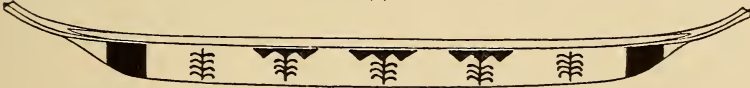
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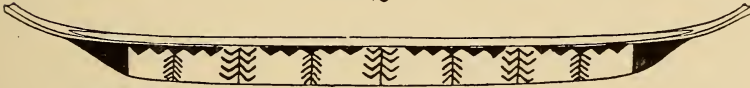
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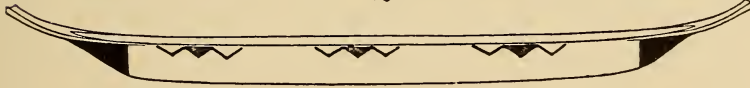
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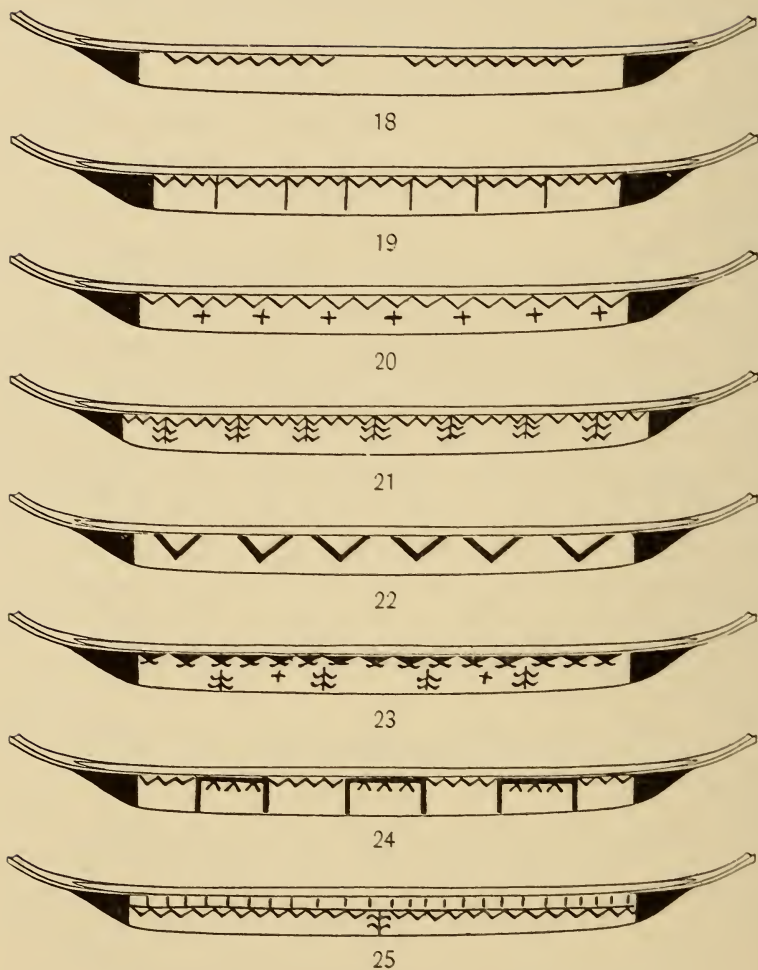


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DECORATIVE PATTERNS PAINTED ON CANOES



DECORATIVE PATTERNS PAINTED ON CANOES

adzed first. The inner sides are adzed first across the grain and then diagonally to it, and finally the bottom is adzed in a similar manner. This work is done with a hand-adz such as that shown in fig. 10.

This tool is of modern introduction, as indeed are the canoes themselves, as well as the method of their manu-

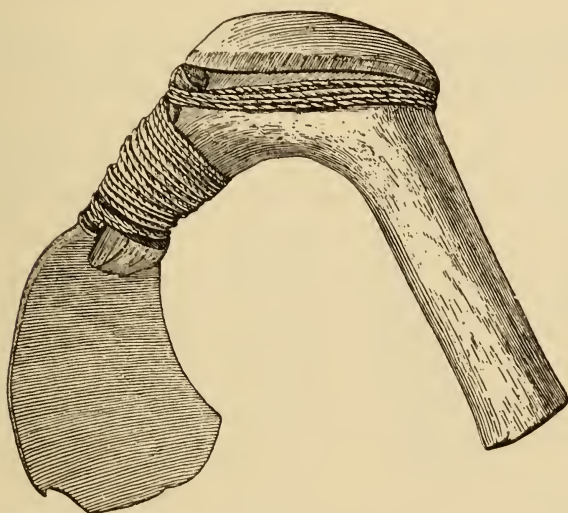


FIG. 10.—Modern adz used in making canoes

facture. The blade of the adz is of steel and is made by local blacksmiths down the river. The wooden handle, shown in fig. 11, is made by the Cayapa, and is so constructed, with the large projection above and with the notches below, that the blade may be securely bound to it, as is shown in fig. 10, by means of pita-fiber string. The blade is concave, and its edge is usually quite regular and curved, so that, while its full width may be

as great as four inches, generally not more than an inch of the edge is in actual play when a blow is struck. The particular adz here shown has a very uneven edge, due to chipping.

The adz is called *aswē'la* and *kū'le mûcte*, both of which terms are derived from the Spanish, the second term signifying "canoe machete." The adz handle is called *aswē'la tyapī*.

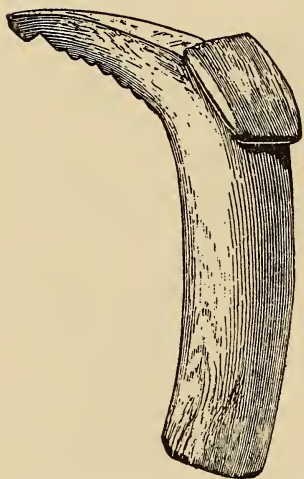
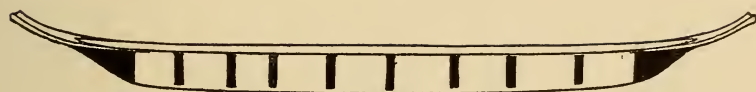
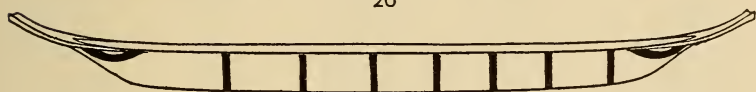


FIG. 11.—Handle of adz

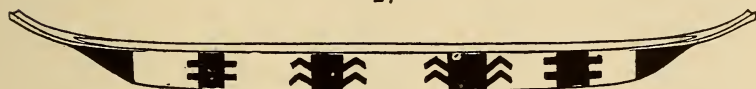
With this hand-adz repeated light blows are struck along one line after another, the lines being parallel, and perpendicular or diagonal to the grain of the wood. By this means the wood is reduced to uniform thickness and the surfaces are rendered comparatively smooth. The final smoothing of the inside of the canoe is done with the adz, but upon the outer surface and along both the inner and outer edges of the gunwales the adzing is followed usually by more or less smoothing with planes, called *sepī'ō* or *sepī'lyū*, made after the fashion of the ordinary carpenter's plane. The sides of a large canoe are thus usually reduced to about three-quarters of an inch in thickness, the bottom having a thickness of between two and three inches. The prow and stern of the canoe are carefully cut to the exact form desired and finished with the adz, no plane being needed at



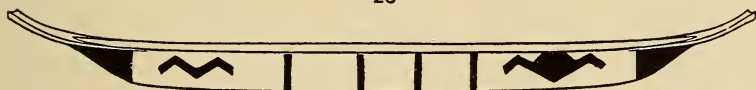
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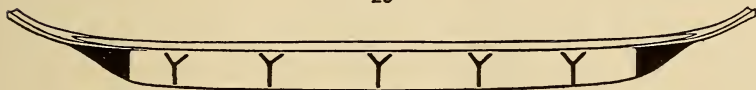
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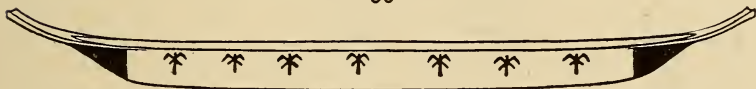
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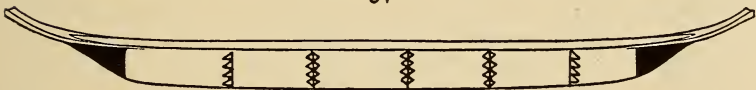
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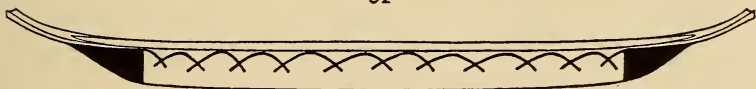
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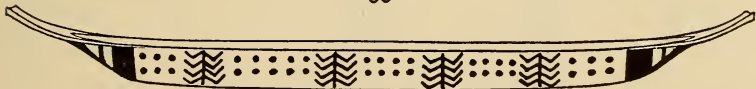
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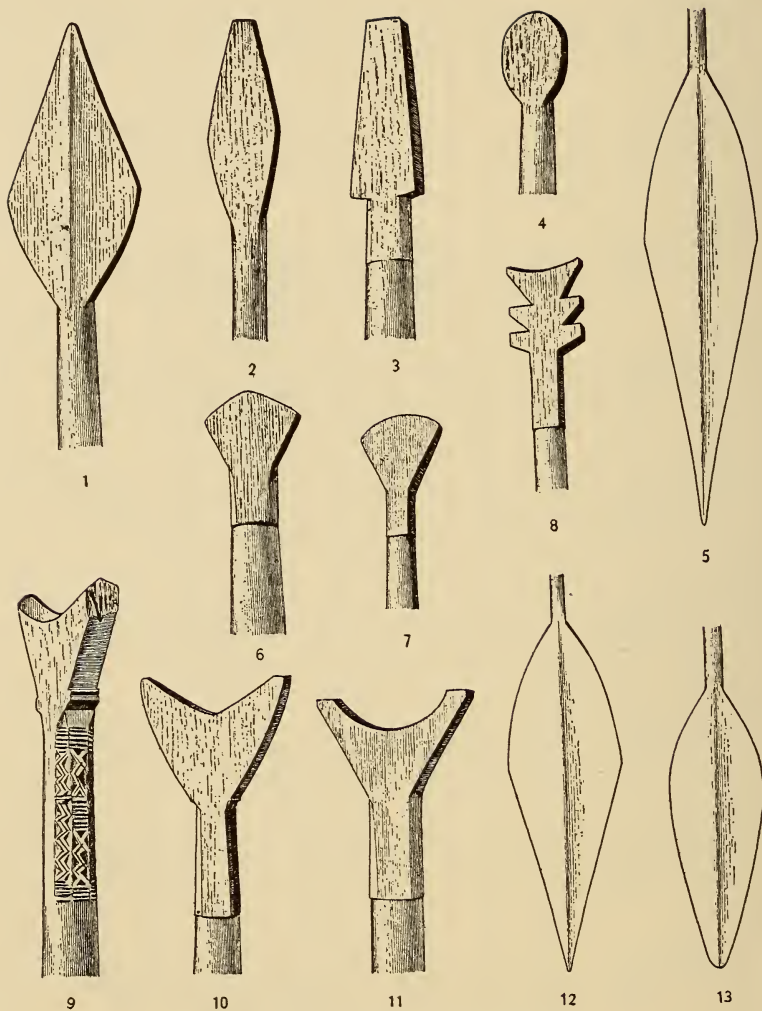


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DECORATIVE PATTERNS PAINTED ON CANOES



PADDLE HANDLES AND BLADES

these points. The form of the prow and stern are characteristic, being very narrow and always very concave on the upper surface of the extreme point, as compared with the negro and the Cholo canoes of this region, thus giving this part somewhat the appearance of a pair of ears. These features are clearly illustrated in the canoes shown in pl. LX. At a distance of from five to seven inches from the extreme point of the prow, there is left a slightly raised line on the upper surface, while on the under surface, at a distance of about three inches from the point, appears a decidedly convex line. The Indians say that the former has no special use, but that the latter serves as a hand-hold in hauling the canoe when landings are made. These two features, together with the hole through which the small mooring cable passes, constitute the only differences between the prow and the stern of the Cayapa canoe.

In general the desired form of a canoe is exactly determined by sighting along it with the eye; but the prow and the stern are carefully measured in order that they may be perfectly symmetrical, and the height of the sides and the thickness of the bottom are similarly measured in order to give the vessel its proper balance.

Having completed the adzing and planing, the canoe is placed under the house and thoroughly dried before calking and painting. Treated in this manner it is of course less liable to check and is more durable. However, canoes are frequently used when green, and those made for sale in the settlements are in most cases only slightly seasoned.

The beeswax for calking and painting the canoe is boiled until of the proper consistency and adhesiveness; this is tested by dropping a small amount of the boiling wax into water and then pressing it between the fingers and also chewing it. The hot wax is applied with a brush about two inches in width, called *kū'kū sapa*, made of a chisel-edged section of the outer fibrous covering of the coconut.

The purpose of the wax thus applied to a canoe is strictly utilitarian. Along the outer surfaces of the gunwale, however, are placed various designs in wax for decorative effect. For this purpose certain stamps made of the light soft balsa wood are used. These stamps are of two forms: one, triangular, with a beveled end, is used for line figures and outlines of triangles and other solid devices; the other is cylindrical and its end is used for making dots. The former is called *pī ke'ndū*, the latter *tsū ka'nū*. The wax must in all cases be applied while very hot, when it soaks into the wood. In order to keep the wax at the proper temperature, the pot containing it is frequently re-heated, fresh wax being added as this is done. The painting with the coconut-bark brush may be done rapidly and requires little skill; but the making of designs with the dies must be done carefully in order to insure uniformity in size, shape, and spacing. Many canoe-makers, of course, use comparatively little care in this painting, especially on canoes intended for sale. However, a man who takes pride in his work is always exact in applying the ornamentation and spares no time or pains

in his craftsmanship. The less particular artisan simply paints rude designs with a small coconut-bark brush.

The designs, called *kū'm bilya*, used upon canoes are varied. They are largely geometric, consisting chiefly of dots, lines, and triangles, although sometimes animal figures are employed. These last, however, appear only on those canoes made by the Cayapa for sale. On pl. LXXII-LXXV are shown most of the designs used by the Cayapa on canoes made for their own use. They bear no special symbolic significance, none of them is typical of any special group of people, and no individual ownership is connected with any of them. In large measure they bear no names other than the generic *kū'm bilya*, literally "canoe design."

As before mentioned, *brea* is the wax made by certain small bees common to the region. It is called *amū'ya*, and is of two kinds, black and yellow, the latter being much preferred. The particular bees which produce the *brea* are of four different species. A small black bee, which lives in hollow trees and is called *paba ta'nda*, makes the wax of the best quality and in greater quantities than any of the others. Another small black species, called *ta'nda* also, lives likewise in hollow trees and makes much more honey than wax, but a certain amount of its wax is used. A third species is called *ciñemi'skī*; it is also black, but builds its nest in the ground and its wax is used to a limited extent. The fourth species is a small yellow bee called *amūī a'ma*; its wax is black.

Brea is obtained by smoking out the bees and chopping

open the log or chopping down the tree. None of these species of bees makes honey of any particular value, hence they are sought almost exclusively for the wax. The bees are very vicious, and therefore a certain amount of danger attends the process of obtaining the brea. In smoking out the bees, ordinarily a wide strip of green bark, about three feet long, or the large blossom bract of a large species of palm, is used as a case in

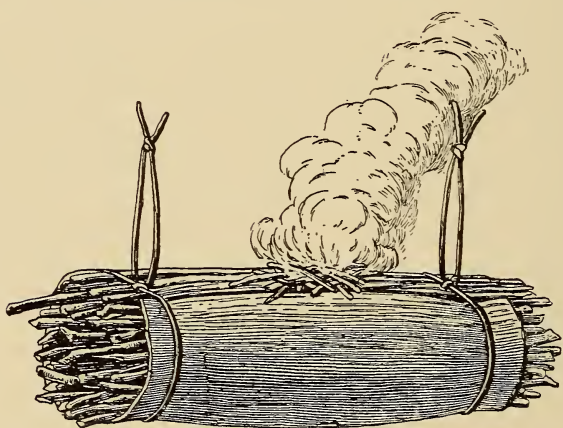


FIG. 12.—Device for smoking out bees

which to place the green or wet wood and coals used to make the smudge. Near its ends this bundle is securely bound by two pieces of pitigua which project enough to make loops about fifteen inches in length, by which the apparatus may be carried about. When completed, this smudging device (fig. 12) is about ten or twelve inches in diameter and three feet in length. It is taken by a man, who has wound about his head and the other exposed parts of his body handkerchiefs or other pieces of

cloth, and is placed near the opening at which the bees enter and leave the tree or log. The smudge apparatus is then fanned until a volume of smoke is produced, which in time drives away or stupefies the bees and makes possible the taking of the brea. The wax is found in large blocks, usually at the bottom of the nest, and is cut out with an ax or a machete. It keeps indefinitely, and is stored either in the house or is buried in the ground until needed.

Shortly before or sometimes just after painting the canoe with brea, a hole is cut in the middle of the prow at a point just back of the slightly raised transverse line upon its upper surface, for the cable by which the canoe is moored. This cable, called kondō'pī, consists usually of from two to four strands of carefully selected pitigua twisted together. Such a cable of three strands is shown in pl. xci, 1. The length of the cable usually varies according to its diameter and the number of its strands, governed by the size of the canoe for which it is made. For very small canoes, frequently a single strand of pitigua is sufficient, but in most cases a two-strand cable is required; very large canoes have three-strand and sometimes even four-strand cables. In making a cable it is necessary first to twist each of the pitigua strands separately, the bark of the strands first having been removed. By means of this twisting the strand is rendered pliable, as well as stronger, since the fibers, which ordinarily would be parallel, are forced to twist around one another. The twisted strand is now wound round a hooked stick, such as that used in cleaning the

cane and plantain fields, and is allowed to dry for a few hours, usually over night. The two or more strands to be twisted into the cable are next tied in a simple knot at one end and the strands passed, one or more, on each side of an upright support. Six or eight feet of pitigua are then unwound from the hooked sticks, and each stick is taken by a person and the pitigua twisted, all strands, of course, being twisted in the same direction. After a sufficient amount of torsion has been secured in these strands, another person takes up the knotted end of the cable and begins to twist the strands together on the opposite side of the upright. In reality he does not himself twist these strands together—he merely pulls sufficiently to bring them out on his side of the upright so that the accumulated force of torsion in the separate strands twists them together into a two- or three- or four-ply cable, as the case may be. This is done very slowly, the worker twisting and pulling here and there in such manner as to cause the strands to twine round one another evenly, producing a cable of uniform size and strength throughout. The strands are unwound from the hooked sticks as rapidly as they are twisted together on the opposite side of the upright, until finally, when the ends of the strands are reached, the cable is prevented from untwisting by another simple knot or by a more or less intricate weaving of smaller strands of pitigua about the main strands of the cable, as shown in the illustration above mentioned and in a manner similar to that represented in greater detail in pl. CIII, 19, 20. This last is the more usual form of

securing this end of the cable, since it is necessary to have one end small in order to pass it through the opening in the prow of the canoe or for whatever other purpose it may be used. Ordinarily the cables are not tied about the prow of the canoe, but are simply passed up through the hole in the prow above mentioned, the knot in the cable below the prow holding it securely.

For ordinary purposes of travel and for carrying regular loads the canoe above described is sufficient. If, however, an excessively heavy or bulky and unstable cargo is to be transported, it is necessary to increase the buoyancy or to steady the canoe by means of outriggers, called by the Spanish name *balsas*, Cayapa na'na. In this region the term *balsa* has four significations. It is primarily a raft or float of any kind, and is the term naturally applied to the rafts of logs or bamboo which the Indians float down the river for sale at the settlements. The same term is applied to the outriggers used on canoes, as also to the tree and its wood from which these are made. This wood is very light, even when green or water-soaked, and when dry it is as light and soft as cork, qualities which make it very useful in numerous ways. The chief uses of balsa wood, however, are due to its buoyancy: it will carry in water much more than its own weight, and it is therefore used in rafting such heavy timber as guayacan. In this process, as many logs of balsa are procured as are necessary to sustain the weight of the guayacan, and these are lashed together into a float, the guayacan timbers being lashed on top of them. The guayacan timbers

are rafted down-stream for use as house-posts, but the balsa logs are also readily sold in the settlements for making outriggers, since they are much used on the imbaburas, or very large canoes, employed to lighter cargoes to and from sea-going vessels.

Among the Cayapa such outriggers are sometimes used, but ordinarily the Indians travel with a cargo so light that the outrigger is not needed. When, however, it is necessary to increase the carrying capacity of a canoe in this manner, logs of balsa from four to eight inches in diameter are cut the proper length, and their forward ends are brought to a form more or less like that of the prow of the canoe. At the middle of the canoe is bound, by means of the two small holes in the gunwales (mentioned as being used in the hauling of the canoe from the woods to the river), a cross-bar of sufficient length to project far enough on each side of the canoe to permit the binding of these logs to it. In binding the logs to this middle transverse bar a block of wood, three or four inches in thickness, is inserted between the upper surface of the log and the bar, thus forcing the log farther into the water at this point. The forward and after ends of the log are each lashed to a similar small hole in the gunwale near the prow, and the stern respectively, these ends being brought up nearly to a level with the gunwale itself and thus three or four inches higher than the middle of the log. In the case of very large canoes, and especially of the imbaburas above mentioned, sometimes as many as three of these logs, as much as a foot or more in diameter, are lashed



LEAVES USED TO RUB DOWN PADDLES

side by side to each gunwale, thus really converting the canoe into a raft. With canoes of ordinary size, however, one log on each side is sufficient. If more than one log is used on each side, it is necessary, instead of binding the forward and after ends directly to the gunwale of the canoe, to bind them also to transverse bars which pass across the prow and stern in the same manner as above described in lashing them at their middle points.

In pl. LXXVI, 5, is shown a typical new blade of a man's paddle just after completion. A comparatively short time only is required to wear down the sharp point until it has more the appearance of the point of the blade shown in 13 of the same plate. The general contour of the blade shown in this illustration is one rarely seen among the Cayapa, but it is common among the negroes of the region. In fashioning a paddle of either type a pronounced ridge is left down the middle of each surface. Along this line the blade reaches a thickness of about three-quarters of an inch. At each side of these medial lines the blade is hollowed out very much after the fashion of a hollow-ground razor; otherwise its thickness is fairly uniform. The thickness of the blade decreases slightly toward the edge, so that the edge itself at the greatest width of the blade rarely exceeds three-sixteenths of an inch in thickness, and it may be as thin as an eighth of an inch.

The handles or poles of the paddles are ordinarily from an inch to an inch and three-quarters in diameter and are almost perfectly cylindrical. They taper slightly from the blade to the upper end, or what may

be called the grip. In a woman's paddle this end may be truly called the grip, and it is usually notched in more or less of a fish-tail form, shown in pl. LXXVI, 9 to 11. This notch is quite smooth, and is actually gripped by the hand. In the case of the man's paddle, however, a purely ornamental tip is put on the end, which is almost never touched in paddling. A few of the typical forms of these ornamental ends are shown in figs. 1 to 4 and 6 to 8 of the same plate.

Occasionally various simple figures are carved either in relief or in intaglio near the upper ends of the paddles. An illustration of such carving relief is shown in pl. LXXVI, 9. Such ornamentation is seen frequently on women's paddles, but only occasionally on those of the men.

As a finishing touch to paddles and in order to make them perfectly smooth, especially along their handles, they are rubbed down with the under-surface of a dry leaf called *lya'pic hakī*, which is covered with minute but very hard spines that serve the purpose of sand-paper. A bunch of these palmate leaves is shown in pl. LXXVII.

Although on a long journey a woman may act as pilot of the canoe, a man sometimes serves in this capacity while the woman sits forward and paddles, as shown in pl. LXXX. Again, it is customary for the woman to use the short paddle on all occasions, but now and then she may be seen using the man's long paddle. Such an instance is shown in pl. LXXIX, where the pilot of the canoe in the foreground is a woman using one of



CANOEING ON THE RIO CAYAPAS



CANOE PILOTED BY A WOMAN



CANOE PILOTED BY A MAN



the long paddles, and the woman sitting forward is paddling with one of them. From these illustrations may also be gained a good idea of the custom of loading a canoe. While in some regions the Indians and also others using canoes endeavor to place the load fairly well aft in order that the prow will point considerably upward, the Cayapa aim so to load their canoes that the ends will practically balance and the canoe will ride as nearly as possible level in the water. They claim that their canoes ride more easily and swiftly when laden in this manner, and also that if it is necessary to load the canoe in such manner that it is not well balanced, it is better to place the cargo forward rather than aft, since if the stern is too low in the water it impedes progress.

As above mentioned when speaking in general of the sizes and uses of canoes, the one used on long journeys and with a carrying capacity of several people is necessarily of considerable length, while on the other hand the man's special fishing canoe is often not more than ten feet in length and frequently does not exceed twelve or fifteen inches in width. All the canoes shown in pls. LXXVIII-LXXXII are of the large type, or what may be termed family canoes, which range from eighteen to thirty-five feet in length.

Some families go very rarely down to the coast; indeed on the extreme upper waters of the Rio Cayapas and the Rio San Miguel there are a few individuals past middle age who, it is said, have never seen the ocean. Most families, however, go at least once a year, while

those living on the main Rio Cayapas and its tributaries to the limit of tidewater, which is just above the confluence of the Rio Camarones with the main river, usually go down to the coast several times a year, each time taking with them a load of various commodities such as plantains, tagua, rubber, and cacao, for sale. For such a journey from two to several days are required, and each member of the family must take along his mosquito canopy, his strip of bark cloth which serves as a bed, and other necessary personal articles, while the party must be provided by the women with cooking utensils and food for the journey. Each member is usually bedecked in his best clothing and necklaces, and it is customary also to paint elaborately the exposed parts of the body, as is done on the occasion of a fiesta.

For the protection of the small children, a mat, such as that shown in pl. CVI, 2, is placed with its two ends just inside the gunwales of the canoe so that it bows up in the form of a canopy. Such a protection is shown in pl. LXXX. The cargo of the canoe is always protected from rain with *hoja-blanca* leaves, or now and then with large plantain or banana leaves. In the Cayapa country, where it rains practically every day, a downpour never hinders one from making a journey. An ordinary rain is met without protection, but if it is very severe one may be well sheltered by holding up a large plantain or banana leaf on the windward side.

It is unnecessary to provide a camping outfit in this region, since hospitality is a custom of the country; consequently in making a journey it is necessary only

to reach some house for the night. It is immaterial whether the resident is an old acquaintance or a perfect stranger, for the traveler is assured of a welcome.

Under ordinary conditions a journey down-stream with the current is easier and more rapid than one up-stream. However, the effect of the tide retards down-stream travel to some extent, but this is compensated by the aid which it gives while one journeys up-stream. It is in all cases customary to travel with the tide, either up or down stream. When going with the current the middle of the stream is taken, as shown in pl. LXXIX, where a canoe is illustrated going down-stream in the middle of the river; but when necessary to travel against the current, the side of the stream is taken. In the illustration mentioned is shown a second canoe making its way along near the bank and against the current.

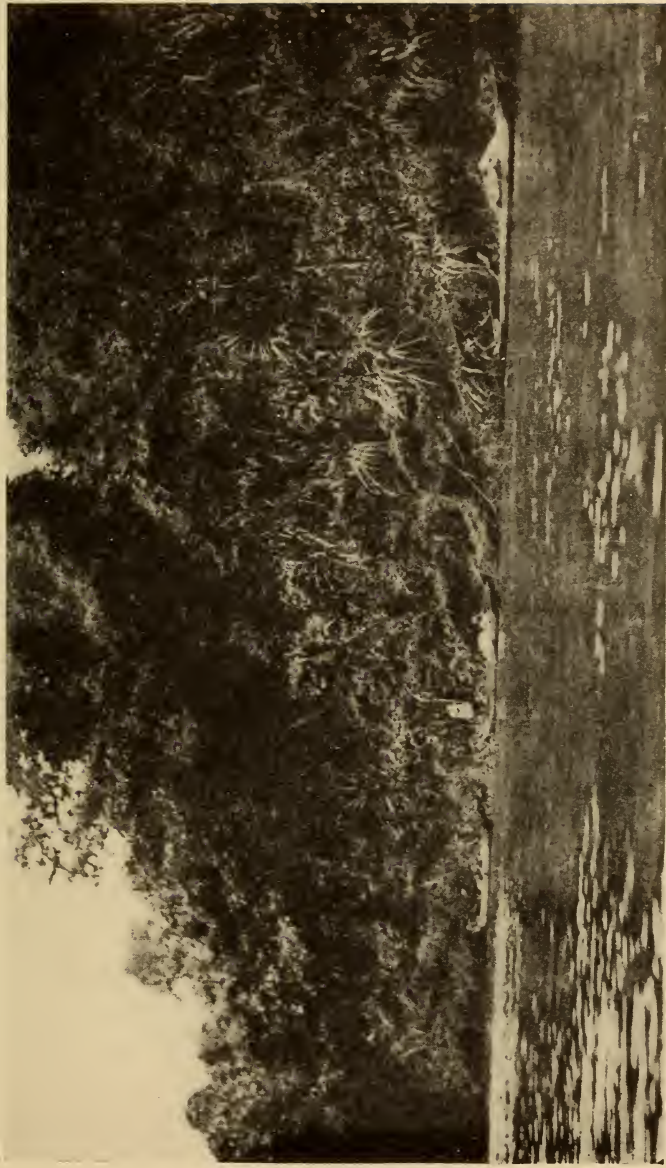
For ordinary propelling under all such circumstances the paddle is exclusively used, though a man's paddle with its long handle may be temporarily converted into a pole when shallow water is reached. When a strong current is encountered, as is the case along the upper courses of the streams or when going against a flood, regular poles, such as those already described, are needed to propel the canoe. Every person in the canoe, including the children, carries his own paddle and is expected to use it almost constantly throughout the journey. Ordinarily in the large canoes not more than two poles are carried, and for a moderate current the pole would be used only by the man in the extreme prow, who frequently stands out on its flat surface as shown in

pl. LXXIX, instead of down in the canoe itself. A paddler standing down in the canoe ordinarily bears his whole weight upon one foot, the other foot being placed upon the gunwale and thus serving both to steady him and to counterbalance the tendency of the canoe to list toward the side on which he is paddling. The stroke of the man's paddle is, by virtue of its length, a long, slow sweep, the blade only being immersed. On reaching the end of a stroke, the paddle is swung in an arc out from the canoe over the surface of the water and again dipped gently and without splashing. The stroke of the woman's paddle, on the other hand, is, by virtue of the shortness of its handle, a short and rather jerky stroke, and she ordinarily takes three or four such strokes and then rests for a moment before taking the next three or four. A man, even when sitting and consequently using only a short length of the handle of his paddle, takes regularly timed strokes, and his whole act of paddling is even and rhythmic.

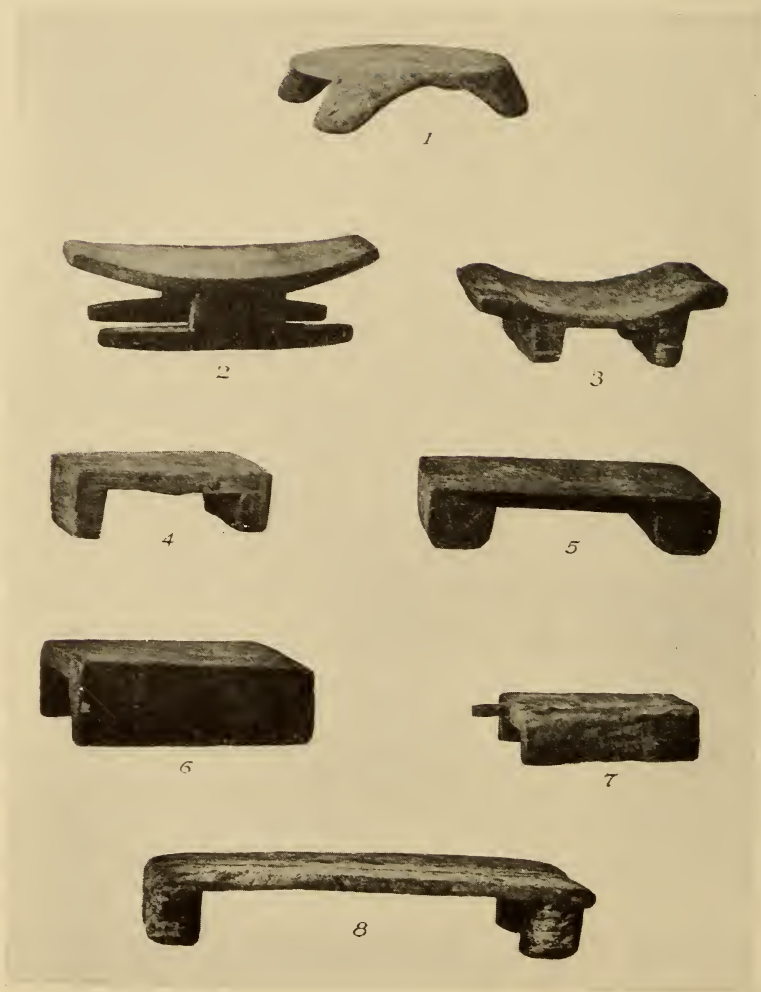
WOODEN IMPLEMENTS

Implements and various other objects of wood are made to a considerable extent by the Cayapa. These will be treated here as a class, although it will be necessary to include under this head objects devoted to many different uses.

Perhaps the most interesting of the various wooden objects used by the Cayapa are the seats or benches called *tcūmbū'lya*. These are of several different types, as shown in pl. LXXXIII, 2-6, 8. They are usually



CANOEING ON THE RIO CAYAPAS



WOODEN SEATS AND BASES

about six inches and never more than eight inches in height, are from six to nine inches in width, and from a foot to two feet in length. They are always hewn from a single block of wood and generally have two supporting surfaces.

In the most common form these supporting surfaces are narrow lines running with the grain of the wood and therefore along the long sides of the seat. This type of seat, an example of which is shown in fig. 6 of the plate, is made by simply hollowing out the under-side of the block so that the upper part of the seat proper is from an inch and a half to two inches in thickness, while the sides upon which the seat rests extend to the floor and are usually not more than from one-half to three-quarters of an inch in thickness at their bottoms.

A second form is that in which the supporting surfaces are transverse to the grain of the wood, and are made by cutting out from the middle of the under-part of the block a section of the required length. Examples of this type of seat are shown in figs. 4 and 5 of the same plate. Fig. 5, in which the under-side of the comparatively thin upper part of the seat is perfectly straight, shows the more common of the two forms.

A third form is practically the same as the last mentioned except that the thick transverse supporting surface is cut out in its middle so as to form four cylindrical posts or legs. Such a seat is shown in fig. 8 of the plate. This is an exceptionally long seat and is quite sufficient to support two people.

In these three types of seats the upper surface is perfectly flat, but in the two types shown in pl. LXXXIII, 2, 3, this upper surface is more or less concave. Both have forms somewhat suggestive of the large stone seats which are such a unique feature of the archeology of the province of Manabi. This is especially true of the form shown in fig. 2. Here are two long supporting surfaces which rest upon the floor and support two upright pieces which in turn support the upper curved part of the seat. If this is compared with certain of the Manabi stone seats,¹³ a striking resemblance is found. Instead of the under-part being cut away, as in the case of this wooden seat, the Manabi stone seat is solid. It has, however, a broad, flat footing comparable with the two long wooden strips upon which the Cayapa seat rests. Upon this broad footing is a very much narrower supporting column on the top of which rests the concave upper part of the seat. This narrow column is carved into an animal form, so that the resemblance of this seat to that of the Cayapa wooden seat is not so great when viewed from the front as it is if seen from the rear. There is now, of course, no means of determining whether there is any connection between these two forms of seat, but the fact that these two similar types exist, the one being part of the remains of an ancient culture and the other a type of seat made and used at present by the Cayapa, is very interesting.

¹³ See Saville, M. H., *The Antiquities of Manabi, Ecuador, Contributions to South American Archeology, The George G. Heye Expedition*, vol. II, pl. xxxv, figs. 1-3, New York, 1910.

The wooden seat shown in pl. LXXXIII, 3, is in all essentials the same as that shown in fig. 2 of the same plate, except that the broad support of the two narrow strips at the bottom is not present. The bottom of this seat, like those of the seats shown in figs. 4 and 5, is made by cutting out a transverse section from the middle of the block so that the two supporting surfaces are sections which run transversely to the grain of the wood. In the seat shown in fig. 2, on the other hand, the center is cut out in the opposite direction, that is, with the grain of the wood. Neither of these types of seat with the concave surface is very commonly used.

These wooden seats are found in almost every Cayapa house, although they are not used so frequently as might be expected. Ordinarily if a man wishes to sit down he uses the hammock, which serves primarily as a baby cradle. It is so swung that its ends are not more than ten to twelve feet apart, and he is able to sit almost erect and lean back against the end. Also the raised platforms at the sides of the house serve as seats. The women and children usually sit upon the floor, although occasionally a bench may be used by one of them, especially by a woman who wishes to spin. In large measure, however, such seats are used by visitors or by the men of the house when it is necessary to sit at some particular kind of work, such as sharpening machetes, adzing and planing paddles, and the like.

A wooden device similar in form to these seats is the base upon which the whetstone used for sharpening

the machete is mounted (pl. LXXXIII, 7). Practically the only difference between this object and a seat such as that shown in fig. 6 of the same plate, is in the presence of the handle at one end. Both the whetstone base and the wooden seat is called *tcūmbū'lya*.

The whetstones, called *tōla'ha*, are made of a fine-grained sandstone and are purchased from the settlements down the river. A stone of almost any size is used, but one six by eight or ten inches is most usually employed. It is not fastened to the base, but simply rests upon it in order to bring the stone a few inches from the floor and to make it possible to place the hands on either side lower than the stone when necessary. With this simple apparatus and a hemispherical calabash of water to wet the stone a man will sit and sharpen machetes for a couple of hours at a time, especially when the cane-field is being cleaned or a new area in the bush is being cleared.

In fig. 1 of the plate last referred to is shown another wooden object similar in form to the seats. This is the special wooden base used as a rest upon which to set an earthenware pot as it is being coiled and shaped. Ordinarily these bases consist merely of a flat board of rectangular form. The one here shown is much more elaborate, being circular in outline and having four legs which slant outward from its perimeter; it is also hewn from a single block of wood, as are all the objects represented in this plate.

Another interesting class of wooden objects is dolls, called *nawa'wa*, made for the amusement of children.

These are carved from single blocks of wood and represent a variety of animate objects. Chief among them are human figures, both male and female; next follow mammals and birds, and now and then alligators are represented. In pl. LXXXIV, 1 to 5, are shown typical dolls representing human figures. The simplest of these, shown in fig. 4, is a cylindrical block of wood with carved head and face. From such simple forms dolls range through various stages of detail to well-carved figures such as that shown in fig. 5, in which the parts of the body are carefully represented and an attempt is made to imitate the cropped hair of the men by carving a raised band about the head, although the doll is evidently intended to represent a woman. The fact that the hair is thus represented is perhaps due to the inability of the workman to carve the long flowing hair of a woman.

Animals and birds of various kinds are carved more or less perfectly. Examples of these are shown in pl. LXXXIV, figs. 6 and 8. Fig. 7 of this plate represents a well-made figure of an alligator. Some of the figures, as for instance this alligator, are made of very hard wood, dressed and smoothly rubbed.

Dolls are about the only playthings, other than small pots, baskets, and other utensils, that the children have, for, as already stated, the Cayapa have practically no games.

In pl. LXI are shown several implements of wood, all of which are used primarily in cooking. In figs. 1 to 5 are illustrated typical mashers, called *matcō'ka*,

used especially for crushing ripe plantains in making the gruel already described. Some of these mashers are perfectly plain, consisting of a cylindrical stick with a large flat end (fig. 4), but most of them are more or less ornate, especially at the upper end. The simplest type of this ornamentation is that shown in fig. 2, in which the upper end of the masher is of a form similar to that of the lower end, but is considerably smaller. Various other forms of ornamental ends, with or without notches, are made; two of these are shown in figs. 1 and 3. Occasionally also some ornamentation is found along the handle, and especially toward its lower end, as shown in fig. 5.

Another wooden implement of special use is the chocolate stirrer, called *tcōkōla'te tca'lī*, two specimens of which are shown in pl. LXI, 6, 7. These stirrers always are provided with lateral projections at their lower ends, by means of which the stirring is done, the implement being twisted rapidly back and forth—between the palms of the hands. Chocolate is rarely used by the Cayapa, but when prepared as a beverage it is usually boiled in a pot somewhat similar to that shown in pl. LXXXVII, 9. The chocolate stirrers also are sometimes ornamented at the upper extremity, as shown in fig. 7, or directly above the four lateral projections at the lower extremity, as in the one illustrated in fig. 6. In the latter case the ring of small ridges projects almost if not quite as far as do the four lateral projections, hence the ridges serve to stir the chocolate as well as do the projections. Whatever useful purpose this ring

of small ridges may now serve, however, it seems to have had its origin in a desire to ornament the stirrers, since most of them are plain at that point (as is the one shown in fig. 7), and because various stirrers of this form have carvings at that point which are similar though much smaller and are obviously purely ornamental.

A second form of stirring implement is the food paddle, called *kūwi'ñgī*, two specimens of which are shown in pl. LXI, 8, 9. These are used for stirring all kinds of foods while cooking, but especially ripe plantain gruel and a kind of gruel or mush made from green corn. In many cases these paddles are perfectly plain, as is the one shown in fig. 9, but now and then they are embellished with notches or incised ornaments as is the case with the one shown in fig. 8.

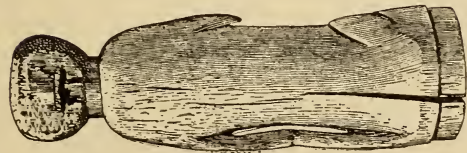
A utensil in common domestic use is an elliptical wooden bowl, copied after a type made by the whites and negroes of the region and bearing only the Spanish name *batea*. They vary more or less in their elliptical form, but a typical specimen is shown in pl. LXII, 4. They are always provided with a projection at each end to serve as handles. They are hollowed out from a single piece of wood, and range from a foot to three feet in length. *Bateas* serve a variety of purposes, but they are used especially for the preparation of certain foods, such as ripe plantain gruel, corn gruel or mush, and the like. They are used also as trays for washing meats or other foods, and frequently are employed in mixing and working clay during the process of

pottery-making. A shallow wooden tray, like that shown in fig. 3, is sometimes, though much more rarely, made by the Cayapa for similar purposes. It also is called *batea*.

Somewhat similar in form to the *batea* is the canoe-shape dish, called *tcambōs kū'le*, used in serving the drink or gruel called in Spanish *champo* and in Cayapa *tcambō'se*, which is made from green corn. This is made exactly after the fashion of a canoe, with the characteristic prow and stern ends, and ordinarily with the painting along the gunwales as well as upon the prow and stern. It is usually from two and a half to three and a half feet in length, and is much wider in proportion than the river canoe, being ordinarily from ten to twelve inches in width. As mentioned in speaking of the uses of corn, the *champo* dish is used only at fiestas for containing *champo* and on rare occasions the ripe plantain gruel called *ma'la*.

Another wooden utensil is a heavy mealing block used especially for pounding green plantain to make the food called in Spanish *bala* and in Cayapa *panda lō'ta*. Such a mealing block, shown in pl. LXII, 1, may be compared in form and size with the average stone used for the same purpose. In fact, these blocks are much less frequently used than mealing stones, such as that shown in fig. 2. The mealing blocks are usually more or less elliptical in form and about eighteen inches in length. With such a block is always used a stone muller.

Various other implements are made of wood, but



1



2



3



4



5



7

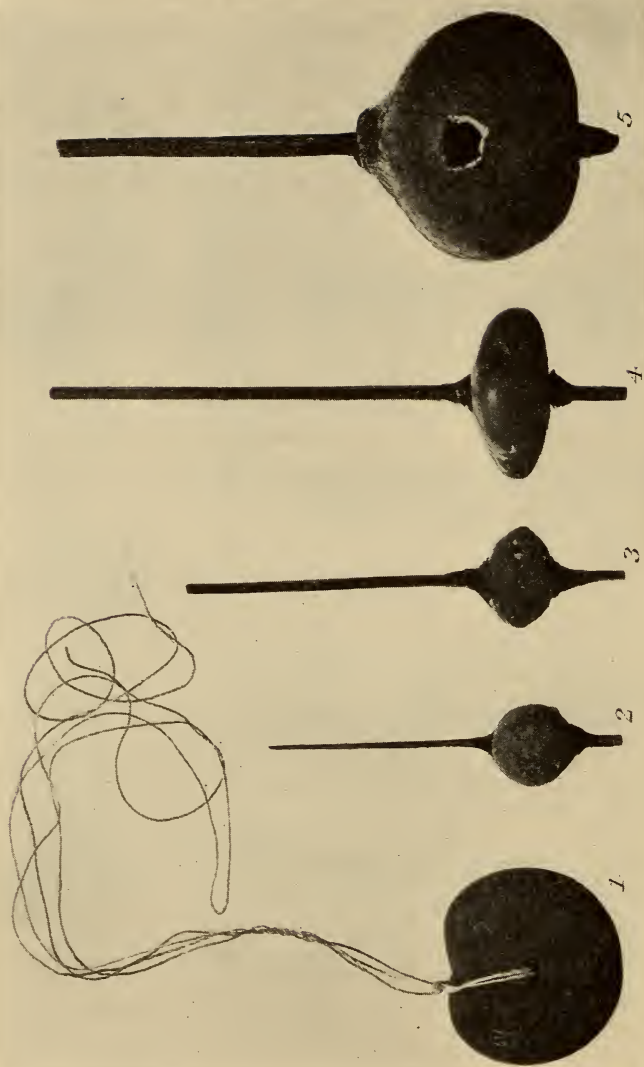


6



8

CARVED WOODEN TOYS



MUSICAL TOPS

most of these have been or will be discussed in other sections of this paper. Among these objects are hooks for suspending various commodities and for use as a fish-pole rack; spinning and weaving implements; mesh sticks used in the manufacture of cordage and netting; mauls for beating out bark cloth; the condensing board or "worm" employed in distilling, and stamps for body decoration and for canoe painting.

STONE IMPLEMENTS

The stone implements used by the Cayapa are confined almost entirely to the mealing stone and the muller. The former is usually a flat stone from eight inches to a foot in width, from a foot to two feet in length, and five or six inches in thickness. The upper side is slightly hollowed by means of pecking with an old ax or other heavy iron implement. Very few of these mealing stones are made at the present time; indeed few modern mealing stones are now in use. A similar type of stone was used by the former mound-building inhabitants of this region, and from these mounds and old village-sites the Cayapa now obtain practically all the mealing stones needed for their use. In pl. LXII, 2, is shown one of these stones of the typical, modern, Cayapa form, in which the depth of the hollowed upper surface is comparatively slight, but usually the mealing stones obtained from ancient sites are hollowed to a somewhat greater depth. The hollowed portion extends over almost the entire upper surface. Along the sides and generally at one end there is left a ridge to

retain the foods which are crushed and pounded upon it. Usually at the opposite end there is no such ridge, the opening serving especially in grinding green corn.

With this mealing stone, and also with the mealing block (pl. LXII, 1), is used a muller consisting usually of a cobblestone from five to seven inches in length, three to four inches in width, and two or three inches in thickness. Sometimes such a muller is shaped artificially. A typical muller is shown in place as it is used on the mealing stone in fig. 2.

The mealing stone and muller are used primarily for making what in Spanish is called *bala*, boiled green plantain mashed and pounded. From one to half a dozen green plantains are put on the mealing stone, then rolled lightly and mashed with the muller, after which they are pounded with considerable force with the muller held in the right hand while the left is used between strokes to return the fragments of plantain, which have been thrown off by the force of the blows, to the center of the mealing stone. From ten to fifteen strokes of the muller result in a mass of fine-grained but soggy plantain of a light-yellow color. This resembles in texture a piece of half-baked bread-dough and is much esteemed by the Cayapa and also by the negroes. The women and girls usually prepare the *bala* for the men and boys, and serve it on plates, or, in the more primitive fashion, upon the cooking leaves called *ū'tya haki*. After the men and boys have been served, the women and girls then make *bala* for themselves, which they eat directly from the mealing stone. After the meal, the muller is laid upon

the floor and the stone inverted over it to keep its grinding surface away from the dogs. When again needed it is cleaned by taking a cooked plantain, grinding it upon the stone, and rolling it around thoroughly over the grinding surface. This process takes up all the fragments of plantain left from the previous grinding, and thoroughly cleanses both the mealing stone and the muller. The ridges on the two sides and one end of the mealing stone help to keep the plantain from flying off during this grinding. The lack of a ridge along the second end, however, is of advantage in grinding green corn, which process has already been described.

Now and then the mealing stone and muller are used for treating other products, such as the inner pulp of the fruit of a tree called *ma'ĩñ-tcĩ*, which is ground and mixed with balsa charcoal to make the black face-paint called *ma'lyũ*.

The only other native stone implement is that used as a sinker on the seine and the casting net. These sinkers are simply waterworn pebbles ranging from two to four inches in length and from an inch to two inches in diameter. They are called *cũpũ'ka*, a general term signifying stone, and appear to have no special name. In large measure these pebbles, unworked, are rolled in the leaf called *ũ'tya haki* and tied directly to the lower edge of the net; but now and then are found sinkers of such form that they are likely to become detached from the net, hence these are provided with rough notches or even surrounding grooves.

Certain smooth stones, and especially black ones, are used in treating the sick.

CALABASH IMPLEMENTS AND UTENSILS

A class of implements which appear to have come into use since the Cayapa moved to the river valley are made from calabashes, the gourd-like fruit of a tree grown quite commonly along the river. It is said by the Cayapa that in former times pottery was used largely for the many purposes which the various utensils made from the calabash now serve, for the reason that this tree does not grow in their former mountain home. They say that the particular species of calabash which they now grow and use so extensively is an importation from Colombia, but that there is indigenous to this section another and smaller species. The Cayapa maintain that the Indios Bravos, who formerly inhabited this region, used this indigenous calabash and made receptacles similar to those which they themselves now make.

As before described, there are now grown two different forms of calabash, the one globose (called *wa'iyū*), the other ellipsoidal (known as *cu'lya*). These fruits grow to about the size of a man's head, though sometimes they are considerably larger, and a tree produces a large number in the course of a year.

The calabash, for whatever purpose it is intended, is always gathered while green, but it is not at its best until it commences to ripen. On the other hand, if allowed to ripen completely it becomes too hard for use. The globose form is much more used than is the ellipsoidal, since the latter yields usually but one type of utensil: the spoon, of which six or eight are obtained from a single

calabash. Now and then a small *cu'lya* is cut into halves and used in the manner of the hemispherical calabash dish called in Spanish *mate*. The globose calabash yields seven types of utensils. Of these the water-calabash (used as a receptacle for storing water), the small trinket calabash, and the cotton-wad calabash (used with the blow-gun), are made from the whole fruit and are therefore globose in form. The *mate*, the sieve, the dipper, and the skimmer, are each made from half of one of these fruits, and consequently are hemispherical.

The spherical calabashes, such as those shown in pl. LXIII and pl. LXV, are called *wa'iyū* and are used for carrying and storing water. They consist almost invariably of the large, entire, globular fruit, with a small opening made at or near the stem for filling and pouring. Such a calabash sometimes measures a foot or more in diameter, and each of the women and girls of the household has usually two at least in number, which she keeps filled and on the water rack near the fire-box. Even little girls have one or two small calabashes, which they regularly fill and use in connection with the cooking, in which art they learn to assist while very young. This smaller spherical calabash is used as a receptacle for various other articles: those measuring from two to four inches in diameter are used to hold such trinkets as fish-hooks and the like, while the smallest ones, called *le'meta*, are for containing the red and yellow *achote* used as face-paint.

When gathered green, calabashes are filled with a mass of fairly hard white seeds and pulp, which are removed

with considerable care, especially from the globose water-calabashes (the wa'iyū) which have such small openings. By repeatedly striking the shell of the calabash gently with the point of a machete or other sharp-pointed implement in such manner as to chip the shell away little by little, an opening of the desired diameter is made: this is usually at or near the point at which the stem of the fruit was attached, and its size depends on the size of the calabash, but it rarely exceeds an inch and a half. With a long implement (wai-be'rū, or wai-be'ū; from wa'iyū, calabash, and be'rū, hook), such as that shown in pl. CXVII, 1, the seeds and pulp are removed. It has one end shaped like a chisel, the other being fitted with a piece of coconut-shell in the shape of a hoe-blade. The chisel end is first inserted and the mass of pulp cut and worked into as small pieces as possible, a small quantity of water being added from time to time. The greater part of the pulp having been thus removed, the implement is reversed and the inner walls of the calabash are scraped with the hoe-end until they are smooth and clean. This process is usually performed in a canoe at the river where an abundance of water is available. Finally the calabash is turned with the opening downward over a stick, outdoors, until it has thoroughly dried. This curing in the more or less direct sunlight changes the color of the outer surface of the calabash from light-green to dark-brown.

Calabash receptacles are frequently ornamented with incised lines or figures, or with grotesque figures of mammals, birds, and human beings. A variety of these

designs is shown in pl. LXXXVI. This decoration is accomplished by cutting with the point of a machete or a knife while the calabash is green, and results, when the utensil is dried, in a white linear figure on a brown background, since it is only the thin outer skin of the calabash that turns brown in the curing. After several days of curing in the open, excepting during rain, the calabash vessel is ready for use. It is rarely put into service immediately, however, since a considerable supply of these utensils is always kept on hand; more frequently it is stored away to season thoroughly and become more durable. A small cross-stick attached to a piece of pitigua cord is inserted in the opening of a globose water-calabash, which is then suspended from a rafter of the house to season. Ordinarily several of these calabashes are thus hung in a cluster. The opening is always plugged with a piece of *hoja blanca*, or of the leaf *ũ'tya hakī*, used in cooking, in order to protect the calabashes from the ravages of cockroaches.

A second type of calabash utensil, called in Spanish *mate* and in Cayapa *cu'lya*, is usually hemispherical and is made ordinarily of the globose form of fruit. Now and then, however, an ellipsoidal calabash is used for this purpose, in which case the *mate* is elliptical in horizontal cross-section. Fig. 13 exhibits a hemispherical *mate* resting on a typical woven ring, made to keep it in an upright position, especially when used to serve liquid at feasts. About the rim and on the sides of the *mate* are shown incised decorations. By cutting the fruit exactly in two, through the stem, a single calabash of

course provides two mates. The cutting is almost always done with an old machete, the edge of which is serrated by striking it with another machete at intervals of about an eighth of an inch. With this crude saw the shell of the calabash is carefully cut along a line marked usually by a string tied tightly around it. The removal

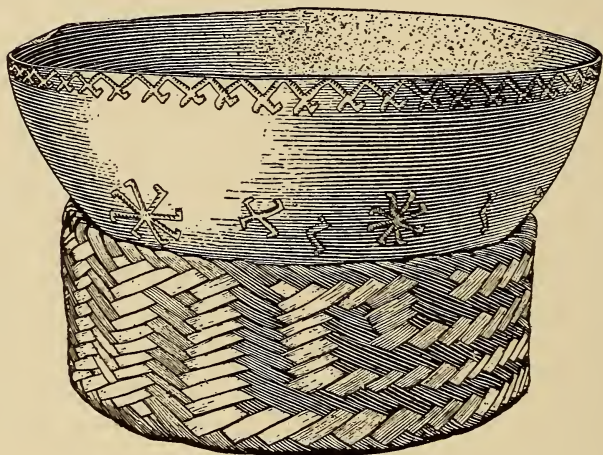


FIG. 13.—Calabash vessel and woven ring

of the pulp is in this case a simple matter. It is first scooped out in large pieces with the point of a machete or a knife, and then, when the inner surface of the shell is reached, it is scraped carefully and smoothly with a small, smooth-edged clam-shell. The drying also is a more simple process than in the case of the water-calabash, since the inner surface is more exposed to the air.

When dry, the mate is used for a multitude of purposes, such as dipping liquids, serving foods, and so on. If permitted to lie for a long time in any liquid, the cala-

bash absorbs the moisture, causing it to soften and ultimately to decay; but if kept in a dry place when not in use, it may be of service indefinitely. Although the walls of one of these calabashes are not more than a sixteenth to an eighth of an inch in thickness, they bear a considerable strain, as when used in bailing canoes. Inasmuch as canoes are always left over night in the river, they often become more or less filled by rain during the night, consequently the need of calabash bailers is very great. On arising in the morning it is the duty of some member of the family, if the day is fair, to go to the river with a mate and bail out all of the canoes, both those of the members of the household and those of visitors.

The advantages of a mate over a pottery or other heavy vessel are apparent: it is easily made, fairly durable, and very light. Its lightness and portability are of special advantage in traveling by canoe, when every pound saved is important; moreover, it will not sink should it be dropped overboard. In fact, advantage is taken of the lightness of the mate in the following interesting manner: Some canoes are very long, and when fully loaded in their center it is impossible for a person in the prow to pass anything, such as food, to one in the stern. Therefore, in event of such need, it is necessary only to place the article in a mate, set the mate in the water, and as the stern of the canoe passes it, it is picked up. To pass any small object, such as a knife, it is usually placed on the blade of one of the long paddles and passed over the cargo. Obviously this could not be done with a round-bottomed mate, especially if it contained liquid.

The mate has still another special use—that of a woman's cap. With it is worn a piece of light-weight black cloth or a double bandana handkerchief, which passes over the head and shoulders and hangs down the back as a protection from the sun. Usually this cap is decorated with incised lines and figures, and occasionally it is used as a drinking-cup in traveling, but it is never put to any of the ordinary uses in which common mates are employed. On long canoe journeys the women usually carry special mates for use as urinals.

By means of two small perforations at each of two opposite points, a hemispherical mate is bound to a long handle to serve as a dipper, especially in the distillation of rum. Such dippers, called *sūmbū* and *ūikala pī cūinūnt-sū'mī*, are shown in pls. LXIII and LXV.

Further, the bottom of a mate may be perforated to adapt it as a sieve or strainer, called *cī'culya*, in making green-corn mush and ripe plantain gruel. Attached to a long handle, such a strainer is employed for skimming the froth which rises in boiling cane juice preparatory to fermentation.

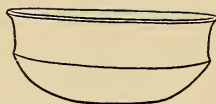
The third form of calabash implement is the spoon, called *ci'ñ kūtcada*, from Spanish *cuchara*. This implement is always made by cutting narrow sections from the side of an ellipsoidal calabash with the saw-like machete above mentioned. One of these fruits ordinarily provides material for six to eight spoons, varying in length from three or four to as much as fifteen inches. The large spoons are commonly used for stirring food while cooking, and both the large and the small



DESIGNS ON CALABASH UTENSILS



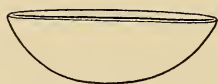
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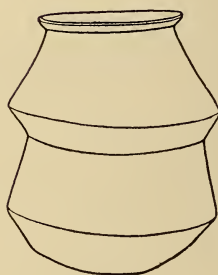
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FORMS OF POTTERY VESSELS

ones are used to a certain extent in eating, although for this purpose they have been largely superseded by iron spoons. Calabash spoons, like the mates, are often ornamented with incised lines.

POTTERY

The Cayapa make a rather crude, heavy pottery vessel, entirely undecorated except in a few forms in which incised lines and dots are impressed in the rim or the shoulder; but no painting, slipping, or glazing is used. The generic name for pottery is *pia'ma*, or *bīa'ma*.

There are in all ten forms of pots, eight of which are in general use among the Cayapa. All are shown in outline in pl. LXXXVII. These types are: 1, A shallow plate form (fig. 4), called specifically *tō' palatō*. 2, A somewhat deeper cooking-pot (figs. 1-3), the sides of which, under ordinary circumstances, are comparatively straight, while the rim is without a lip. 3, Another cooking-pot (fig. 6), with a more or less hemispherical base, a pronounced shoulder around the side, and a prominent outcurving lip. 4, A small, flat-bottomed pot (fig. 5), somewhat of the form of an inverted truncated cone and with a more or less outcurving lip. 5, A somewhat globose form (fig. 8), with wide neck and outcurving rim. 6, A large storage olla (fig. 11), called specifically *bū'lūm bīama*, with slightly oval bottom, more or less conical sides, and narrow neck with outcurving rim. 7, A large pottery caldron (fig. 7), which forms part of the still. 8, The condensing chamber (fig. 10), without bottom, used in distilling rum. Pots of the

forms shown in figs. 1-2, 6, are without special name, being known by the generic term *pīa'ma*. Those of the forms represented in figs. 5, 7, 8, are called *kanda'rō*.

To these earthenware vessels may be added a ninth form, though it can not strictly be considered as a separate type, since it is made by breaking off the lower portion of one of the other forms (fig. 12). It is set over the fire and serves as a kind of chimney to direct the smoke and heat upward to the fish that are laid upon sticks across its mouth for curing. There is also used, though rarely, for making chocolate, a pot with reëntrant sides like that shown in fig. 9.

The clay, called *tū* or *tō*, used in pottery-making is yellowish-brown in color and is dug from the banks of certain esteros. Usually a considerable quantity is gathered at a time and brought by canoe to the house, where it is worked over to remove stones, sticks, and other impurities. It is then wrapped in leaves and put in a shady place until needed, being moistened with water from time to time. For tempering the pottery there is mixed with the clay a bluish, gritty earth, called *lu'c tū*, meaning literally "blue earth or clay," which also is found in a few places along the river.

In making pottery, the woman takes a quantity of cleaned clay and again works it over to remove any remaining foreign substances, water being added if necessary to make it plastic. When the clay is of the proper consistency, the bluish, gritty earth above referred to is thoroughly kneaded into it, in quantity equaling perhaps one-tenth that of the clay. This



POTTERY VESSELS SET TO DRY



FIRING POTTERY

tempering material is called *tū ya'ndū*. The mixing of a small quantity of clay is a mere matter of rolling and kneading it in the hands; but if a considerable quantity is required, as in making a large olla, it is usually mixed in a large wooden tray such as that shown in pl. LXII, 4. After thorough kneading, handfuls are torn from the side of the mass and thrown back violently on top of it. This process completed, a small lump of the clay is taken, or a very small, crude pot is made, and immediately baked in the fire-box in the house as a test.

To make a small plate-form utensil, one about four inches in diameter, a lump of prepared clay is rolled carefully between the hands to form a smooth sphere. The right thumb is then inserted and the ball of clay is turned about it in such manner as to make a depression in the center. Then by constantly pressing between the thumb and the fingers as the ball is rotated, the depression is gradually enlarged until finally the bottom and sides of the pot, of even thickness, are formed. If the vessel is very small, this work may all be done upon the palm of the left hand, but if it is of medium or large size, a board, ten or twelve by fifteen or eighteen inches (pl. LXXXVIII), or other flat object is used in order that the vessel may readily be turned. Occasionally the wooden base is elaborately made, as that shown in pl. LXXXIII, 1, which is circular, has four legs, and resembles in some respects the wooden benches before described. Its special use, however, is that of a rest for the larger pieces of pottery, and it is claimed by the Cayapa that it was rarely or never used as a seat.

The bottom and sides of the small receptacle having been formed, the edge is trimmed and made of uniform thickness by placing the thumb on the inner surface at the edge, the end of the first finger on the edge itself, and the ball of the second finger on its outer surface. By passing the fingers, held in this position, back and forth over a space two or three inches at a time, the edge is gradually reduced to uniform thickness and all unevenness is removed. Places thinner than desired are patched with a small quantity of clay carefully worked in and smoothed like the rest. Should there be a place that is too thick, a pinch of the clay is taken with thumb and finger before the smoothing is commenced. The edge is finally smoothly finished with the inner surface of a small piece of green banana or plantain peel.

There is always a certain roughness on the inner and outer body surfaces of a pot at this stage; this is removed by means of small instruments, called *tōmbilya'mba*, made usually from sections of broken calabash dishes or spoons, the edges of which are ground on a stone until they are uniform in outline and sharp. The smoothing of both the surfaces and the edge having been completed, the pot is set in the shade to dry and harden. This requires, in the case of a small, thin-walled pot, only a few days, when it is ready for firing. Care is taken not to dry a pot too rapidly, and that it dries uniformly, on account of the danger of cracking due to differential shrinking.

The base of a larger pot is made from a lump or mass of clay in the same manner as that above described, except that the edge is not smoothed so carefully. This



POTTERY AFTER FIRING

base is set in a cool, shady place to dry partially, then the remainder of the pot is built up by the coiling process. A base is shown in the foreground of pl. LXXXVIII, in which an unfinished pot of medium size is seen on the board used as a rest and which enables the potter to turn the vessel about easily and without pressing it out of shape. Such a base is dried, for a length of time depending on its size and the thickness of its walls, until it is hard enough to bear the weight of the first coil upon its edge. A pot six or eight inches in diameter will dry sufficiently in two or three days to permit of the application of the first coil, but a large and correspondingly heavy olla requires several days to dry.

The coils are made by rolling out between the palms of the hands a rope of clay of a length equal to the circumference of the pot and of a thickness, for a pot of medium size, usually not more than a half to three-quarters of an inch, and for a large pot not more than an inch. A groove is made with the ball of the first finger the full length of the coil of clay, which is then placed with the groove downward over the edge of the pot, any surplus being nipped off with the thumb and finger at the point where the ends meet. These two ends are then worked together with the thumb and fingers, and the edges of the groove in the coil are next pressed down upon the edge of the portion of the pot previously completed. While this finished portion of the pot is more or less dry and hard, it is not hardened sufficiently to render it unpliant, hence it is easy to mingle the new clay of the coil with the old clay of the formed portion. The upper

part of the coil is now worked out with the thumb and fingers until it is of the same thickness as the lower portion, after which its edge and sides are smoothed as were those of the portion of the pot already completed.

This one coil is usually sufficient to complete a plate-form pot of medium size, but in pots of other forms and sizes the number of coils varies. After the addition of each coil, the pot is set aside to dry somewhat before the next coil is added, since the moist clay is not sufficiently stiff to support a considerable weight.

This method of forming the bottom and lower part of the sides applies only to the small and medium-size pots. In making the bottom of a large pot the following method is employed: An old pot or other object of approximately the size and form desired for the bottom of the pot to be made, is covered with thin leaves or with a piece of cloth in order that the clay may not adhere to the rigid surface. A large lump of clay is then worked out into a thick disc, which is laid on the form and patted and worked in such manner as to cover it uniformly and of the required thickness. While still on the form, it is allowed to dry, since the clay required for this part of such a vessel is of such quantity that it could not stand alone. Such a form with the bottom of a large olla upon it is illustrated in pl. LXXXVIII. The fresh clay is shown here formed upon the cloth-covered bottom of a large cooking-pot, the black cloth appearing below the edge of the clay. At last, when the bottom is sufficiently dry, it is removed from the form and its sides and edge are smoothed as above described in speaking of smaller receptacles. Hence-

forward the process of building a large pot, coil upon coil, is the same as that employed in making small ones.

The largest earthenware receptacles made by the Cayapa are the storage ollas (pl. LXXXVII, 11), used for the fermentation of cane-juice, these vessels being sometimes of a diameter and height of three feet. These large ollas are highly prized, as it is difficult to build up successfully, with the comparatively narrow coils of clay, such large vessels without a flaw in joining the coils. It is also hard to get the clay used in the various coils always of exactly the same consistency, and it is especially difficult to dry the olla properly without checking or other mishap. But the greatest difficulty of all is in the firing; indeed, although a considerable proportion of such large vessels fail in the early stages of their construction, probably ninety percent of those successfully built up and cured, crack in the firing. On the other hand, comparatively little difficulty is experienced in modeling and firing small or medium-size receptacles of varying shapes.

As before stated, the only decoration found on Cayapa pottery consists of small incised dots and lines on the edge of the opening or the shoulder, and even this simple ornamentation is rarely used. The vessel is decorated after being only partly dried. The lines are incised with the sharp-edged calabash instrument used for smoothing the surfaces of the receptacle, while the dots are made by means of the serrated edge of the shell of a small bivalve. The decoration consists almost invariably of a simple row of parallel lines placed vertically or obliquely. Now and then a zigzag is used.

After a pot has become fairly dry and hard, its surface receives the final smoothing, and in some cases it is given almost a polish. This is done by means of a large discoidal nut, called *mūlumbū mūnge'nū*, indigenous to the region. The same nut is used in making tops and also the spinning handles for tops. In pl. LXXXV, 1, 4, it is shown used in these two ways. In smoothing pottery the edge of the nut is wet with saliva and is rubbed back and forth repeatedly over the vessel, thus smoothing the surface and making it more impervious by filling the pores. No slip or paint of any kind is used.

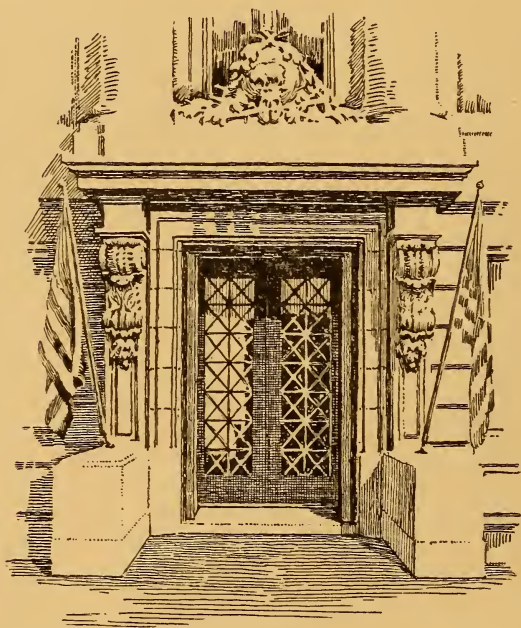
The vessels are now ready for firing. A quantity of wood is gathered and the pots are carried to an open place near the house. Here they are stacked one within another or arranged on the ground in any convenient manner, and a kiln is made by carefully piling wood around and among them. Coals are brought from the fire-box in the house, the pile is ignited, and the fire is carefully watched and more wood added as required. A pottery kiln is shown in pl. LXXXIX, the photograph for which was taken just after the fire was lighted. This firing process requires from twenty minutes to an hour, depending on the number and size of the pots, and the quantity of wood used. As the fire dies down, the pots are left as shown in pl. xc, being now thoroughly fired. The earthenware is generally removed with a pole while still hot, and is tested by tapping gently to detect any possible cracking. If badly cracked the vessels are immediately thrown away, but in the case of large pots that are only slightly cracked, they are often kept and repaired with wax (*brea*).

If possible some ripe-plantain gruel, called *ma'la*, is poured into the newly-fired pots, which are returned to the embers where the gruel is soon cooked. This cooking serves to fill the pores of the pottery, rendering it practically impervious. If it is not practicable to boil the gruel immediately, the inner and outer surfaces of the receptacles are later rubbed thoroughly with green plantain for the same purpose. This method, however, is considered inferior to the other.

All pottery used for ordinary cooking and serving is completed with the firing and the filling of the pores with plantain. Those pots, however, designed for use in fermenting cane-juice in making rum or for the storage of liquids, rather than for use over the fire, are given a coating of brea, usually inside and out, which renders them impervious. It would be useless to apply the brea to pots that are to be placed over the fire, since it melts at a low temperature and readily ignites. Also, if a pot is not intended for storing liquids, there is no reason why it should be entirely impervious, since all earthenware will hold liquids for a short time without allowing moisture to pass through it to any detrimental extent.

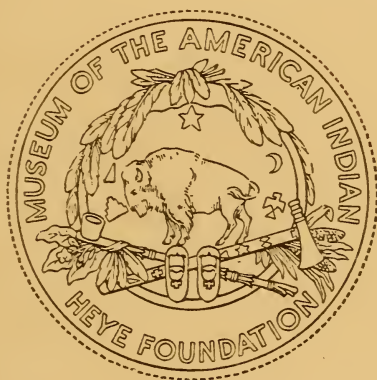
So far as is known, fired clay serves but one other purpose among the Cayapa, that of making small sinkers, called *wengōtca'li*, for fish-lines. These sinkers are either globose or cylindrical, with perforations through the center, and are fired in the same manner as ordinary pots. A line with its sinker is shown in fig. 9 (page 131).

INDIAN NOTES



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